SKYWAYS

MILITARY ★ CIVIL ★ COMMERCIAL AVIATION

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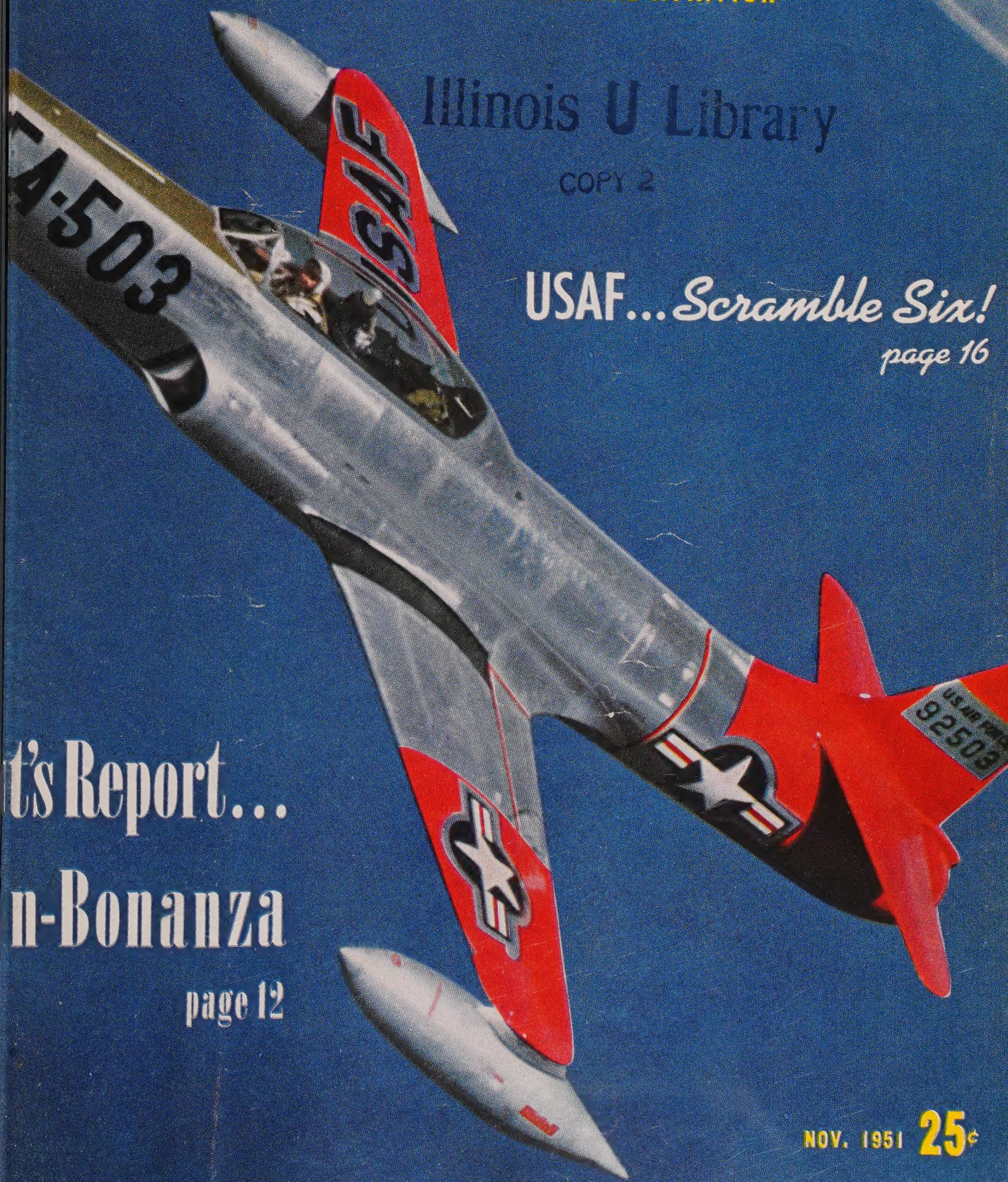

USAF... *Scramble Six!*

page 16

t's Report...

n-Bonanza

page 12

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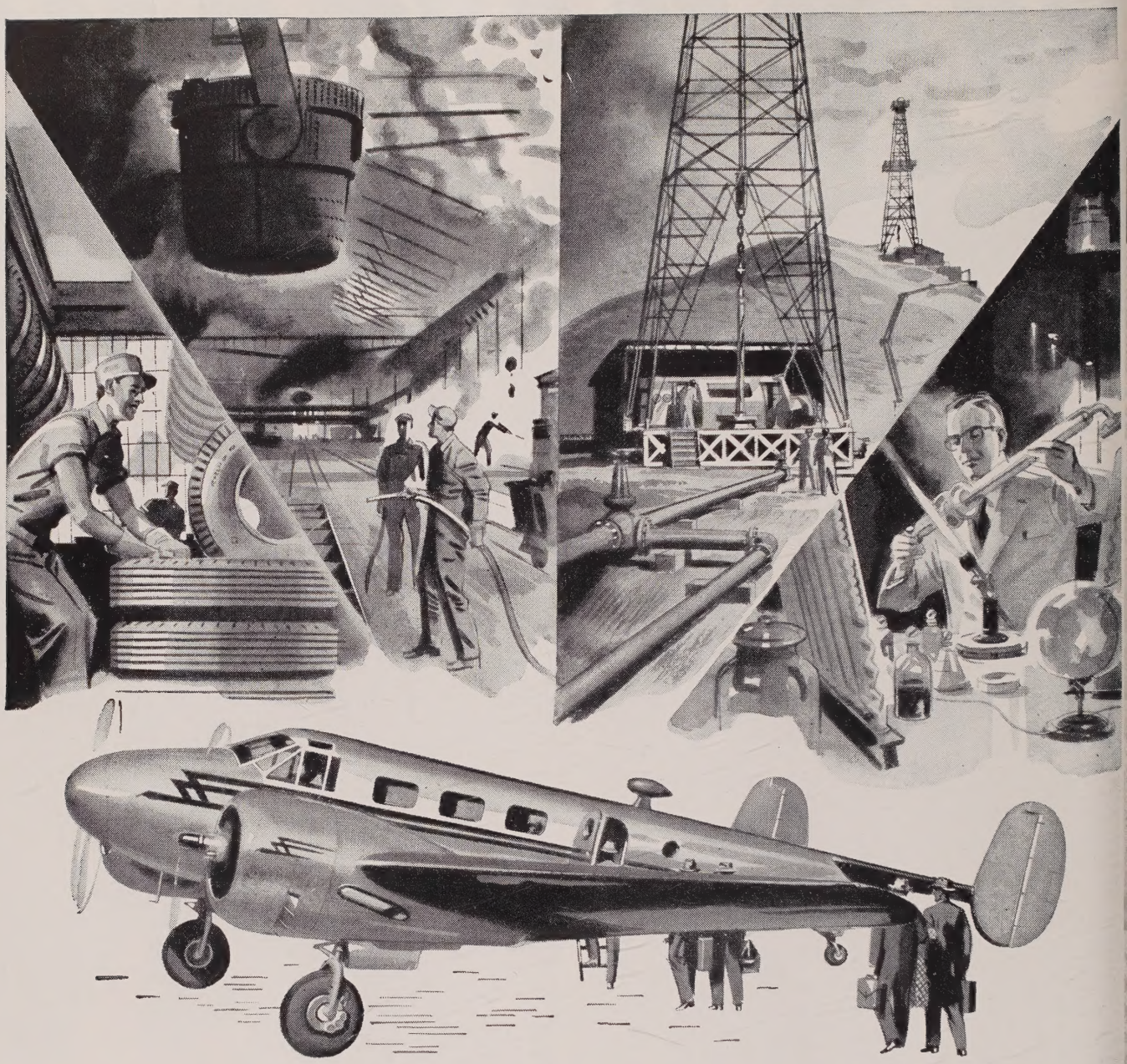

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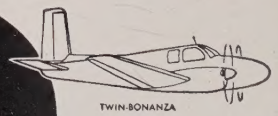

BEECHCRAFTS ARE THE AIR FLEET OF AMERICAN BUSINESS

PLANE FAX

Quick picture of

SONOMA COUNTY AIRPORT

Santa Rosa, California

Two 5000' runways, one lighted all night. Perimeter taxi strips. Big concrete mats—no tie-down charge. Restaurant, lounge, limousine service. CAVU weather four days out of five. Near Russian River resort area.

How Fire Planes Help Guard Our Forests

Warren Boggess, head of Pacific States Aviation at Santa Rosa, tells this story:

"We're right on the edge of big timber country here in Sonoma County. That's why one of our most important operations is fire spotting. On hot, quiet fall days, when smoke hugs the forests, fire towers are often ineffective. That's when the Forestry Service calls on us to make an air-borne 'timber cruise.'

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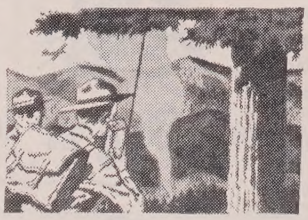
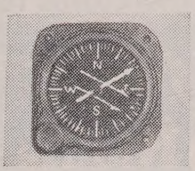


"Timber terrain is rough, too, which means sudden pull-ups and full-power flying generally. It's a strain on any engine—but backed by RPM Aviation Oil and Chevron 80/87 Aviation Gasoline, we know we can count on top engine performance at all times. The proof of their efficiency comes when we take engines down. They're clean—which makes for all-around economy and longer life."

T.M.'S "RPM," "CHEVRON," REG. U.S. PAT. OFF.

TIP OF THE MONTH



Warren Boggess says: "Your compass may save your life. Be sure it is swung every six months, and following any major alteration in equipment.

"We've checked a lot of compasses here at Pacific States—and too often they're off 15 or 20 degrees. In night, or low visibility flying, that can be a fatal error."

CHEVRON AVIATION GASOLINE

RPM AVIATION OIL

STANDARD OIL COMPANY OF CALIFORNIA

Vol. 10, No. 11, November, 1951, SKYWAYS is published monthly by J. Fred Henry Publications, Inc., 444 Madison Ave., New York 22, N. Y. Printed in U.S.A. Single copy 25 cents. Subscription Prices: U. S., possessions, Canada and Pan-Am. Union $7.00 for three years, $5.00 for two years, $3.00 for one year; all other countries add $1.50 per year for postage. Six weeks required for address changes (give both old and new address.) Manuscripts, drawings, other material must be accompanied by stamped, self-addressed envelope. SKYWAYS is not responsible for unsolicited materials. Reentered as second-class matter April 16, 1948, at the post office at New York, N. Y. under the act of March 3, 1879. Copyright 1951 by J. Fred Henry Publications, Inc.

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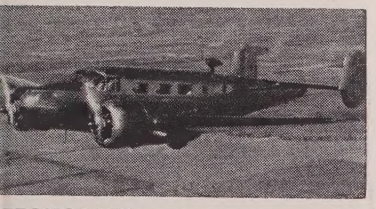
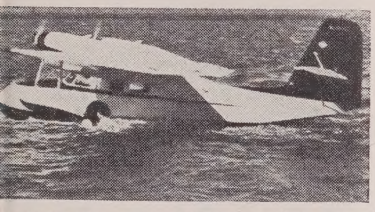
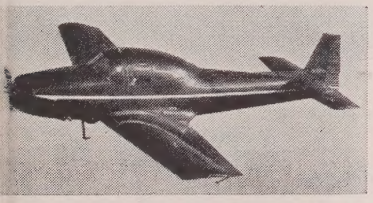


EECHCRAFT D-18-S TWINS—5 FOR ALE—$43,100 UP. Executive, #84373S, as only flown 300 hours. Nose tank. Colns radio. Omni-range. ADF. Many exras. New condition throughout. Practicaly unused. Exceptional airplane. $55,000. Consult **POWERS & GEORGE.** "Airlanes Everywhere."

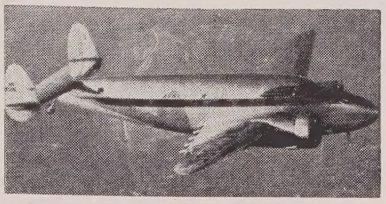


RUMANN WIDGEONS—11 FOR ALE—$10,000 UP. G-44, #31127S, as revised hull. 2 hours since rebuilt 951. Metal props. Gyros. Radio. $14,000. lso; G-44A, #45922S, with 258 hours. ngines zero. Hartzell props. Gyros. adio. $22,500. Consult **POWERS & EORGE.** "Airplanes Everywhere."



AVIONS—49 FOR SALE—$5000 UP. 948 Ryan, #4729KS, has 280 hours. ew upholstery. Gyros. Omni-range. DF. Bargain. $7950. Also; 1949, #4251S, with 283 hours. Metal propeller. Latst stacks. Extra tank. Gyro. Omni-range. 0,000. Consult **POWERS & GEORGE.** Airplanes Everywhere."

IPER TRI-PACERS—2 FOR SALE— 51, #653AS, has 165 total hours. etal propeller. Primary blind instruents. Lear omni-range and ADF. angared. Undamaged. New condition. 500. For complete details and inspecon arrangements consult **POWERS & EORGE.** "Airplanes Everywhere."



LOCKHEED LODESTARS—17 FOR SALE—File #99S represents several 15 passenger airliners in good condition with closets, lavatories and well equipped buffets. Hydromatics. Best airline instruments, radio, and auto pilcts. $31,000. Consult **POWERS & GEORGE.** "Airplanes Everywhere."

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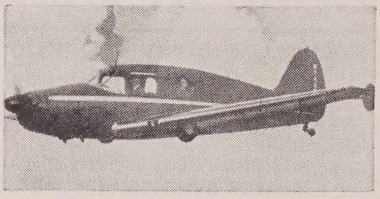
*We are sorry that we cannot offer or list ships worth less than $1500.

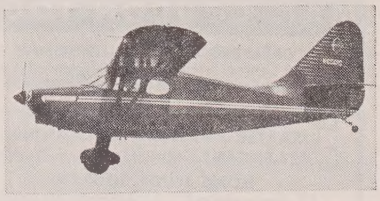
SWIFT 125'S—18 FOR SALE—Painted 1946, #84628S, has 310 hours. Aeromatic. Radio. $1800. Also; 1947, #3616KS, with 288 hours. Aeromatic. Radio. $2125. Also; 1950, #2836BS, with 294 hours. Extra tank. Aeromatic. Gyro. Bargain. $2850. Consult **POWERS & GEORGE.** "Airplanes Everywhere."

PLUSH EXECUTIVE DC-3 — FILE #100S — FOR SALE — Corporation owned. 2000 total hours. Completely rebuilt 1951. 8 chairs, 2 divans, coat closet, lavatory, and buffet. Exceptional instruments, radio, and A-12 auto pilot. $200,000. Consult **POWERS & GEORGE.** "Airplanes Everywhere."



BELLANCA CRUISAIRS—18 FOR SALE—$2675 UP. Late 1948, #78415S, has 140 hours. Outside baggage door. Aeromatic. Directional gyro. Stall warning. Radio. Always hangared. Never damaged. One owner. Hand-rubbed finish. Beautiful. $4375. Consult **POWERS & GEORGE.** "Airplanes Everywhere."

BEECHCRAFT BONANZAS—33 FOR SALE—Painted model 35, #2232VS, has majored engine, auxiliary tank and loop antenna. Clean. $6750. Also; painted late 1949, model A-35, #8903AS, with low time and extras. $9000. Also; several later ships. Consult **POWERS & GEORGE.** "Airplanes Everywhere."



STINSON 165'S—28 FOR SALE—$2225 UP. December 1948, #6095MS, has 210 hours. Metal propeller. Primary blind. Radio. Loop. Hangared. Beautiful. $3125. Also; 1949, #6083MS, with 185 hours. Metal propeller. Radio. New condition. $3500. Consult **POWERS & GEORGE.** "Airplanes Everywhere."

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SKYWAYS

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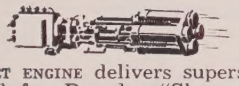
"BIG FOUR" provide U.S. Navy with "Balanced Power"



ROCKET ENGINE delivers supersonic speed for Douglas "Skyrocket" (top).

TWIN-JET ENGINE gives pure jet thrust for Douglas F3D "Skyknight" (second).

TURBO-PROP ENGINE combines speed and endurance for Douglas A2D "Skyshark" (third).

RECIPROCATING ENGINE provides work-horse efficiency for Douglas AD "Skyraider" (bottom).

Experience with all four modern types of power for aircraft in one manufacturing plant is unique. Yet Douglas has that experience as the result of prudent, peace-time planning with the Navy.

Best known of these Big Four is the AD-Skyraider. This reciprocating-engined attack bomber has been in production since 1946, and is now a battle-tested veteran.

In 1950 the twin-jet F3D Skyknight was started down the production line at El Segundo.

Also in volume production is the A2D Skyshark, turbo-prop attack plane. And the rocket-powered D-558-2 Skyrocket recently set new world records for speed and altitude as it sought scientific data to help build tomorrow's aircraft.

By manipulating the design, development and production of these power types, the Navy and Douglas have arrived at a flexible, "balanced power" position from which our air strength can be increased swiftly. Douglas Aircraft Company, Inc.

Skilled engineers and technicians find Douglas a good place to work!

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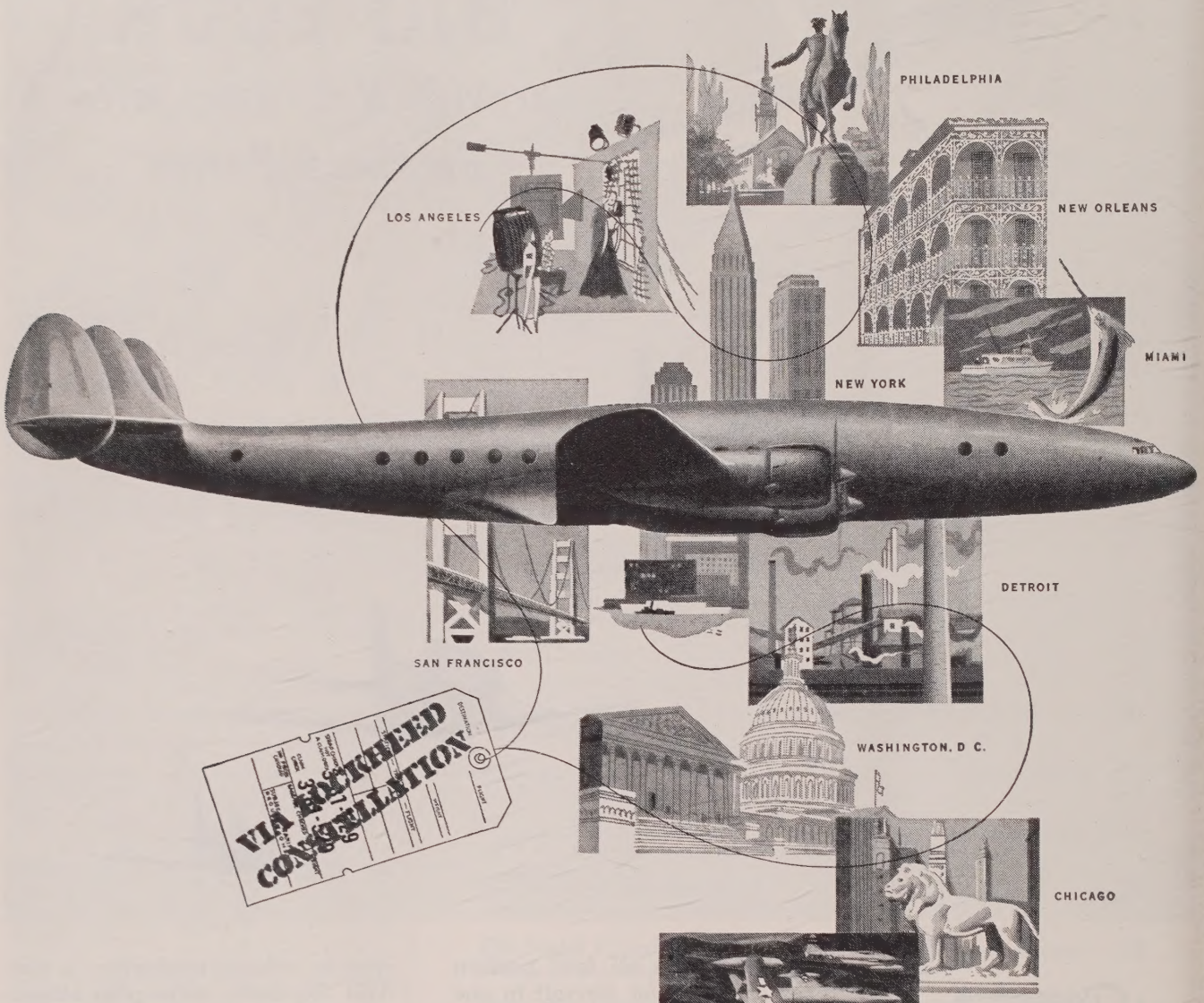
Leadership demands constant achievement



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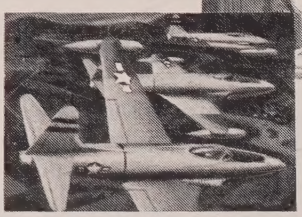

KOREAN BOOMERANG—Like Lockheed's famous Hudson Bomber ("Old Boomerang") of WW II, the F-80 *Shooting Star* has proved rugged in combat. Built to take terrific battle damage yet return to base, the F-80 did exactly that in Korea . . . another "Boomerang."

SCIENCE OF DEPENDABILITY—Lockheed's new Electronics Building will house an advanced "Weather Laboratory," where every effect of weather can be studied firsthand...increasing the *experience* behind Lockheed dependability.

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Lockheed

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Lockheed

BEGINS WORK ON GIANT JET BOMBER

Production of an undisclosed number of giant B-47 jet bombers has begun at Lockheed's Marietta, Georgia, factory. As the world's leading producer of jet aircraft and modern high-speed transports, Lockheed is especially qualified to build the Boeing-designed B-47's for the Air Force. Production floor space at Marietta, plus Lockheed's California factories, makes Lockheed as large today as the entire U.S. air-frame industry in 1940.

What's going on at Lockheed?

Lockheed has developed a high-speed camera with a speed range of from 1,000 to 3,000 frames a second. At 3,000 per second, a 100-foot roll of 16-mm film goes through the camera in 1¼ seconds. Purpose of the speed: to check results when fast-dropping bomb hits a blank piece of metal. Objective: development of stronger, new-type alloys for greater, faster aircraft . . . Another current research project creates arctic flying conditions 20,000 feet above the California desert. On an actual F-94 All Weather Jet Fighter, a spray bar shoots a fine, foggy mist on the nose and wing, building up layers of ice. Plane's de-icing equipment is thus tested in actual flight.

Past and future at Lockheed...

One of Lockheed's earlier transports, a Model 10 Electra, is approaching its 25,000th hour of flying time, in continuous service since 1937 for South Coast Airways, Pty., Ltd., of New South Wales (Australia) . . . New Lockheed Super Constellations, in service by year's end, will be the largest, fastest, rangiest commercial transports in service. So well have earlier Constellations proved themselves around the world that more than 100 Super Constellations were ordered before the first production model flew . . . The new Lockheed-developed thin wing for the advanced F-94C—so thin it looks almost fragile—is strong enough to support two fully-loaded Super Constellations (150 tons dead weight)—one at each wing tip. This new plane, America's continental defender because of its electronic superiority, contains enough installed electrical power to supply a small community.

AIR YOUR VIEWS

Pounds Thrust and Horsepower

Gentlemen:

In the September issue, the answer given to Mr. Hill's question about horsepower versus thrust is quite misleading. Getting back to fundamentals, let's see how thrust and power are related. Thrust is merely force, and when force acts through a distance, work is done. Work is measured in units expressing the product of a force and a distance, such as foot-pounds ($W = FD$). Power, however, is the *rate* at which work is done, and is therefore a work unit divided by a time, or a force unit multiplied by a velocity, as foot-pounds per second ($P = FD/t = FV$). Here then is the key to the mystery: velocity must be specified if thrust is to signify power. Since by definition a horsepower is 550 foot-pounds per second, then at the speed of 550 feet per second every pound of thrust is equivalent to one horsepower. This speed happens to be 375 mph. A jet engine delivering 5,000 pounds thrust at 375 mph is delivering 5,000 hp to the airframe. At 750 mph the same engine develops a power of 10,000 hp, at rest a power of zero. In other words, the power is proportional to speed if thrust is constant. This is the reason why jet engines are rated in terms of thrust rather than horsepower, and why the formula given in your answer cannot express the performance of the jet engine. While I have not seen the book you quote, I hazard a guess that the formula given expresses something else, such as the power delivered by the turbine to the compressor in a typical jet engine. If this is the case, it must be pointed out that such power is completely consumed within the engine itself and does not express the performance of the engine in terms comparable to shaft horsepower of a piston engine.

A. G. VAN ALSTYNE
Engineer

Los Angeles, Calif.

We are indebted to you, Mr. Van Alstyne, for setting us straight on horsepower and pounds thrust. Again, thanks.—ED.

What is it?

Gentlemen:

In the August, 1951, issue on page 46 is a picture of a low-wing airplane. What is it and do you have its performance figures?

M. AIKENS

Ogden, Utah

That is a Vultee BT-13A, a two-place World War II basic trainer powered by 450-hp Pratt & Whitney Wasp Jr. *engine. It has a cruising speed of 170 mph, a maximum range of 1,050 miles, a 53-mph landing speed, and a service ceiling of 21,000 feet. It was affectionately called "Vultee Vibrator" by the boys who flew it during their Air Force training days.*—ED.

Over . . . But Not Out

Gentlemen:

I have just read "Over But Not Out." As a Miami reserve weekend pilot I feel qualified to say that I thought it was a swell article. I can go along with any gripe the tower operator may have. Here is a very effective way to improve the air around an airport: At Oakland we make a trip to the tower and observe and ask questions and shoot the breeze with the boys. These people really know their job and can handle any out-of-the-ordinary situation without the slightest effort. I have yet to see or hear a fouled-up tower operator . . . and I sure can't say that for us pilots.

ROBERT L. PEDROTTI
Capt. USMCR

Petaluma, Calif.

Speaking for the often maligned tower operator, we thank you for your comments, Capt. Pedrotti, and we go along with you on the efficiency of those tower fellows. Pilots should be so good!—ED.

What is it . . . Again

Gentlemen:

In your August issue you had an article "Who Pays?" With that article you had a picture of a cracked-up airplane. Well, my buddy and I had a little argument as to make of that aircraft. I said it was a Fairchild 24, and he said it was a Funk. Who is right?

By the way, are there any aviation-minded girls who would like to write to lonesome sailors (Airedales) who are now in Korea?

R. J. KAMIENSKI
G. M. SMITH

USS Aventinus ARVE-3
FPO, San Francisco, Calif.

Whichever one of you Airedales said the plane was a Funk . . . is wrong. It was a Fairchild 24 on floats. Note the inline engine cowling.—ED.

Landing Speed?

Gentlemen:

In your September issue in the story about Muroc, you state that the rocket-powered X-1 lands at roughly 3 miles per minute. That's 20 mph. Isn't that pretty slow?

D. GILL

Des Moines, Iowa

Twenty miles per hour is slow, but maybe you'd better check your arithmetic. Three miles per minute times 60 minutes in an hour equals 180 miles per hour. Right?—ED.

Neg Blemish?

Gentlemen:

I've noticed that "mark" on the XB-51 in several different photographs of the Martin jet bomber . . . and I don't think it's a blemish!

G. RALSTON

New York, N. Y.

Further check with Martin indicates it is a piece of equipment which the company is not permitted to discuss or describe because of military security.—ED.

Wanted: Mustang or Thunderbolt

Gentlemen:

In your September issue I read an article by Capt. Blair on his non-stop flight, and I would like to know what sort of a reward a person gets for doing such a thing. Also, are there any surplus F-51's or F-47's which can be purchased?

L. DEPOSIAN

Los Angeles, Calif.

Very little tangible reward, mostly a personal feeling of accomplishment within a field that holds the "winner's" heartfelt interest. As far as the availability of an F-51, we understand Capt. Blair's ship is up for sale.—ED.

CAP in Iowa

Gentlemen:

In your June issue you told a young man from Alabama where he could get information about becoming a CAP cadet. Could you tell me whom I should contact here in Iowa?

J. JARRARD

Victor, Iowa

We're glad you're interested in CAP. It's a wonderful organization doing a swell job. Your CAP is located at Room 213, Old Federal Bldg., Des Moines. Wing Commander is Lt. Col. H. F. McKinney.—ED.

TEMCO BUCKAROO presently is being demonstrated as an armed light ground-support plane for Army. Two-place T-35 carries 10 rockets, two 30-cal machine guns, gun sight, camera

MILITARY AVIATION

Bendix Winner

Col. Keith K. Compton, flying a sweptwing F-86E *Sabre*, streaked from Muroc, Calif., to Detroit in less than three-and-a-half hours to win the transcontinental Bendix Trophy race. The 36-year-old Air Force pilot averaged 553 mph, including time on the ground for refueling at Denver and Omaha, on the 1,919-mile flight. Col. Compton's official elapsed time from take-off at Muroc to the finish line at Detroit-Wayne Major Airport was 3 hours, 27 minutes and 56.4 seconds. The old Bendix record, set in 1949 by Maj. Vernon A. Ford, was 529 mph.

T-35 Buckaroo

An armed version of the Temco T-35 *Buckaroo* military trainer is now being demonstrated to the Armed Services as a light, highly maneuverable ground-support plane. The two-place low-wing monoplane is equipped with two 30-cal machine guns, gun-sight, a gun-camera and 10 2.75-inch rockets, mounted five on a rail under each wing. The plane is powered by 165-hp Lycoming engine, and has full lighting and instrumentation for night and instrument flight.

Army Aviator Training

Army Aviators, a new classification in the U.S. Army ground forces, are getting flight training and classroom instruction at the Taloa Academy of Aeronautics, Oakland, Calif. This training, to qualify the aviators for CAA instrument pilot ratings, is being given at Oakland Airport under a contract awarded to the academy by the Sixth Army. The name "Army Aviator" was given to distinguish the holders from the pilot classification of the Air Force. Extending over a period of eight weeks, the course includes Link instruction, associated classroom study, plus 40 hours of flight. When the men have finished their training, they will be assigned to serve the infantry, artillery, engineers, and signal corps ordnance branches of the Army as pilots in reconnaissance, observation, courier and liaison work.

MIG-15 Study

A complete engineering analysis of a Russian MIG-15 fighter is presently being made by the Air Materiel Command at Wright-Patterson AFB, Dayton, Ohio. The plane was one shot down by UN forces off the west Korean coast and salvaged by the Navy.

Scorpion Minus Canopy

Tests made at the Air Force Flight Test Center, Edwards AFB, have provided proof that both crew members of the Northrop F-89 *Scorpion* can effectively operate their seat ejection systems to escape in an emergency at speeds in excess of 500 mph. Five flights were made in an F-89 with its cockpit canopy removed. The initial tests were conducted with a life-size dummy seated in the radar operator's cockpit. When no damage resulted, other tests were made, this time with E. P. Hetzel, assistant chief of Northrop's experimental flight department, seated in the radar operator's seat. These flights were made at about 250 mph at various altitudes, with standard aviation goggles and Lombard flight helmet being worn. The final test flight was made at 520 mph with Major John Stapp, USAF aero medical officer, wearing a type PI-A helmet with two-position visor for eye protection. Major Stapp suffered no injury and was capable of maintaining all facilities during the flight.

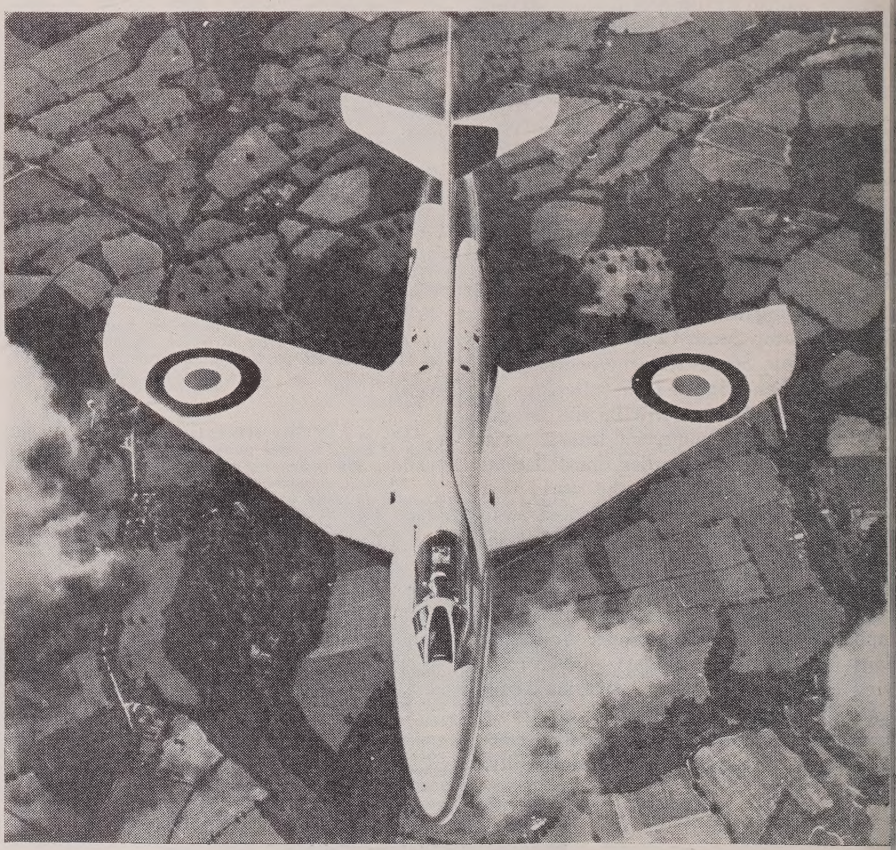
News Notes

BENDIX AVIATION has named George R. Faustman general factory manager of Bendix Radio Div.

CIVIL AIR PATROL Col. Donald D. Webster, commander of the National Capital wing of CAP, was elected president of the National Aeronautic Association. Maj. Edward E. Slattery Jr., Public Information officer of the National Capital wing, was named president of the Aero Club of Washington, an NAA affiliate.

FAIRCHILD has obtained exclusive rights for the manufacture and sale of a French gas turbine auxiliary powerplant, the *Oredon*, designed and built by Societe Turbomeca.

HAWKER P-1067 is Great Britain's newest swept-wing fighter; also officially labeled "the fastest in the world." Ordered for RAF, it is going into production right from the drawing board



Grumman

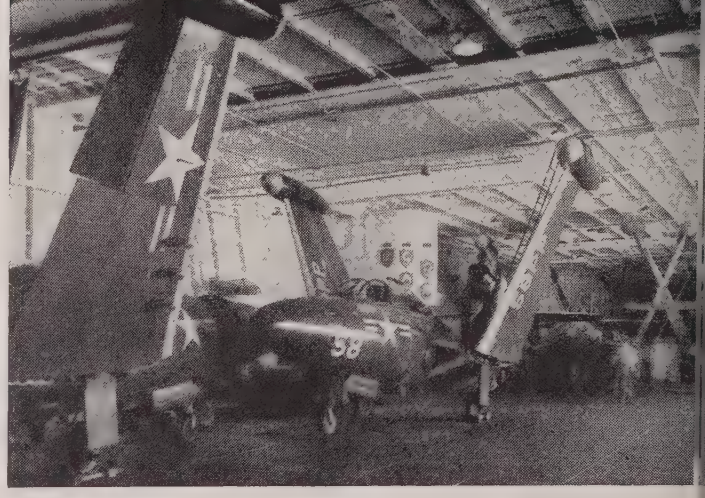
PROTECTION FROM DANGEROUS DIRECTIONS

To our fleet, the most dangerous directions are "up" and "down." Enemy aircraft bomb from above . . . enemy submarines torpedo from below. Momentarily caught at the same altitude are two planes charged with fleet protection. Nearest, a radar-equipped, sub-hunting GUARDIAN and in the distance a turbo-jet PANTHER fighter. Both PANTHER and GUARDIAN possess traditional GRUMMAN ruggedness and dependability.

GRUMMAN AIRCRAFT ENGINEERING CORPORATION, BETHPAGE, LONG ISLAND, NEW YORK

Contractors to the Armed Forces

NAVY PANTHER searches for target near Hungnam in North Korea. Fighter is one of the jets based on *USS Boxer*



JETS, like these shown here on hangar deck of *USS Boxer,* have posed no more operation problems than other planes

Air Navy Sharpens Its

CATAPULTS launch jets from carriers in a hurry, while Davis barrier stops them safely after a deck landing

SKYRAIDER has proved to be outstanding Navy plane in Korean War. It carries about same ammo as an AF B-17

Air Navy action in the Korean War proves seamen's swords are sharp

By Lt. Cmdr. MATT PORTZ, USN

Unlike most July days over North Korea, Old Man Weather had made this one a stinker. Intermittent banks of low clouds and fog had reduced visibility to almost zero, but fast carrier Task Force 77's *Skyraiders, Corsairs* and *Panther*-jets were still plowing through to their targets. As was almost every other day, this was knock-out-bridges-trains-and-troops day for the pilots of the Essex-class *Boxer, Bonne Homme Richard* and *Princeton.*

During this deadly game of hide-and-seek with the Communists, Lieut. Fred Warren of Pharr, Tex., led his *Skyraider* flight over a Red-infested, wooded ridge on the central front. The visibility was so foul that only through the grace of God and expert directions from the ground controller did he find that particular target at all. After a double check with the controller to make sure he had the proper target in sight, Warren let the Commies have it. The *Skyraiders* literally burned off the ridge with their napalm fire bombs, and for good measure, chewed it up with rockets and fragmentation bombs.

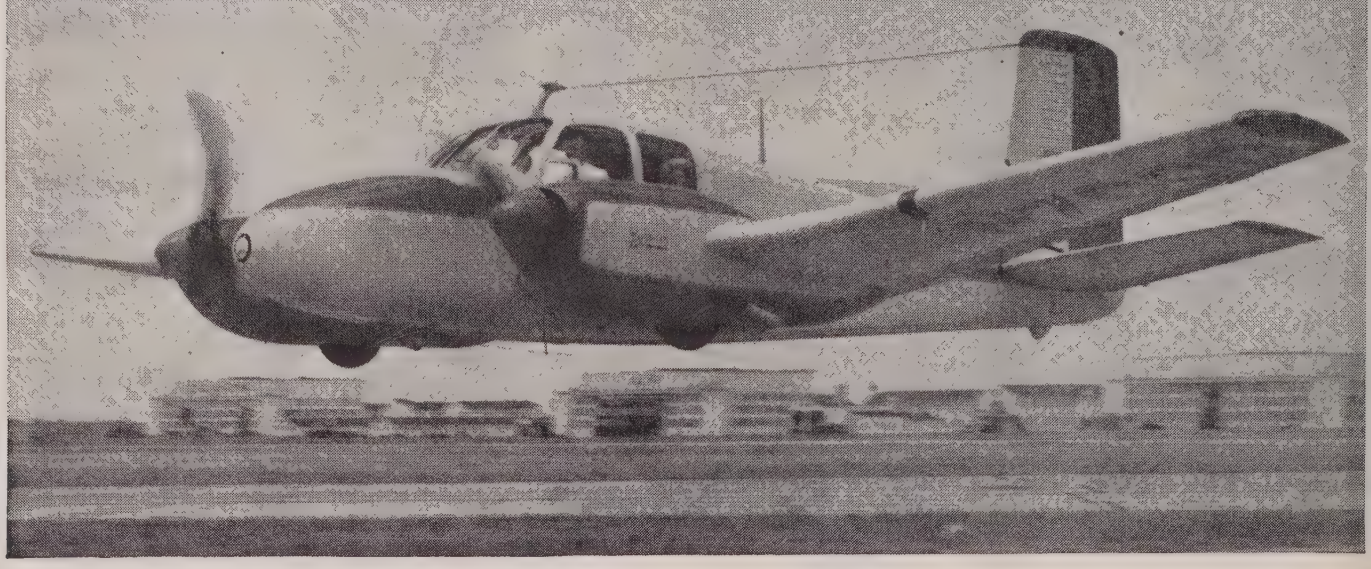
After polishing off that gang, the controller had another job for Warren. The Reds were bringing up ammunition just to the rear of the fighting lines in ancient but effective mule carts, and were feeling quite safe and smug under the weather's protection. The smug (*Continued on page 48*)

ORDNANCEMEN of Task Force 77 load 20-mm's into a *Panther*

Sword

HELICOPTER stands guard while a Navy *Corsair* starts its take-off

AIR PHOTO shows damage done to Wonson Oil Refinery by planes of the Seventh Fleet on one of the carrier air strikes against Korean Communists



TAKE-OFF from Will Rogers Airport was made at 75 mph, 10° flaps. Landing gear took 8 seconds to retract fully

Pilot's Report...

Flight in new Twin-Bonanza proves plane to be perfect for businessman

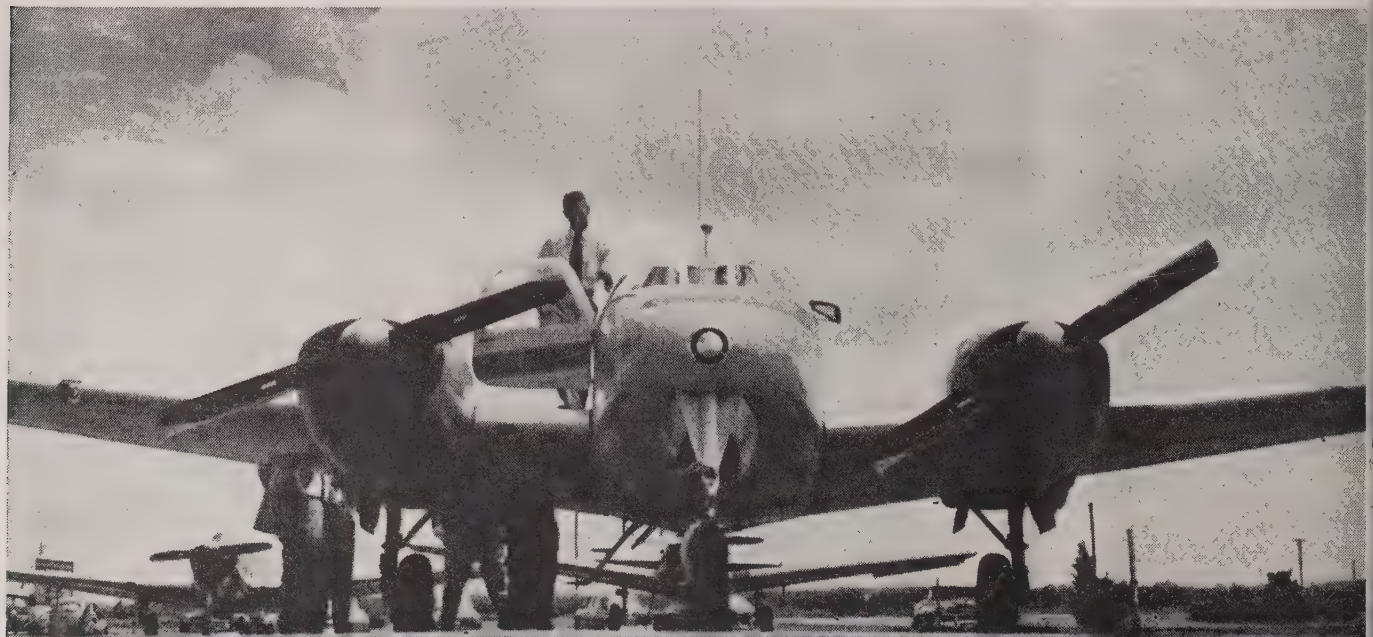
By DON DOWNIE

TWINS ARE quite an event in any family—and Beechcraft's *Twin-Bonanza* is no exception.

Modern business leaders all over the country are watching this little executive transport with interest and enthusiasm. Company transportation that proves to be reliable, fast, relatively inexpensive and simple to operate is bound to have a strong market in America today.

Already over 100 *Twin-Bonanza* Model 50's have been ordered, with a substantial deposit to assure delivery at the $44,995 price established by Beechcraft for the original model. Without exception, the buyers are business firms planning to use the new

12 **ENGINES** in the *Twin-Bonanza* are six-cylinder geared 260-hp Lycomings. Propellers are full-feathering Beech models



Twin-Bonanza as an executive transport.

So what kind of an airplane is this new "Twin?"

A crowd of guests had gathered at Oklahoma City's Will Rogers Field when N700D taxied up to the Aircraftsmen Inc., hangar. Norman Blake, Oklahoma's top Beech salesman (He has sold 63 *Bonanzas*), had invited his best sales prospects to come out and fly the new plane and prove to themselves its value.

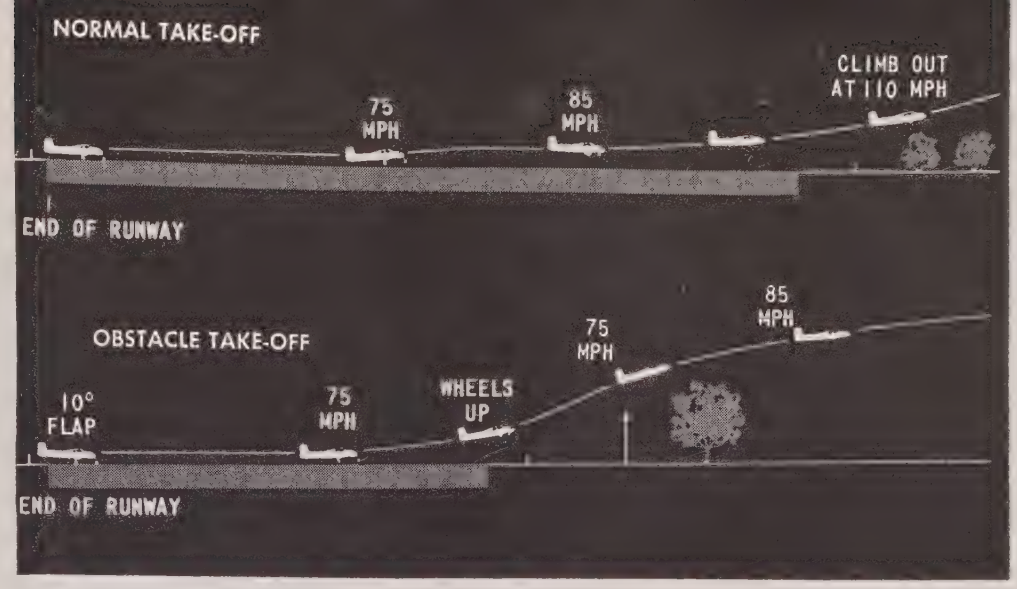


CHART shows normal take-off of the *Twin-Bonanza* and the obstacle take-off procedure

Factory pilot for these demonstrations was Warren F. "Jelly" Filer who has been with Beech since 1940. N700D was the Number Two airplane off the production line and had been flown about 150 hours in demonstrations. The Number One *Twin-Bonanza* is being used by the factory for research. Number Three is slated for the Lycoming engine factory, and Numbers Four and Five will go to the Carco Airline, the shuttle service between Albuquerque and the Atomic Energy proving grounds at Los Alamos, where they will actually be service tested during regular operation.

There's a lot of the single-engined *Bonanza* in the new Model 50. When asked just how much design and tooling from the other Beech products had gone into the new "Twin," pilot Warren Filer replied, "The door, side panel of the front windows, ailerons, flaps and outer wing panels are copied from the little *Bonanza*. That is, the outside shape is the same, but the structure has been 'beefed up' to handle the higher speeds and weights."

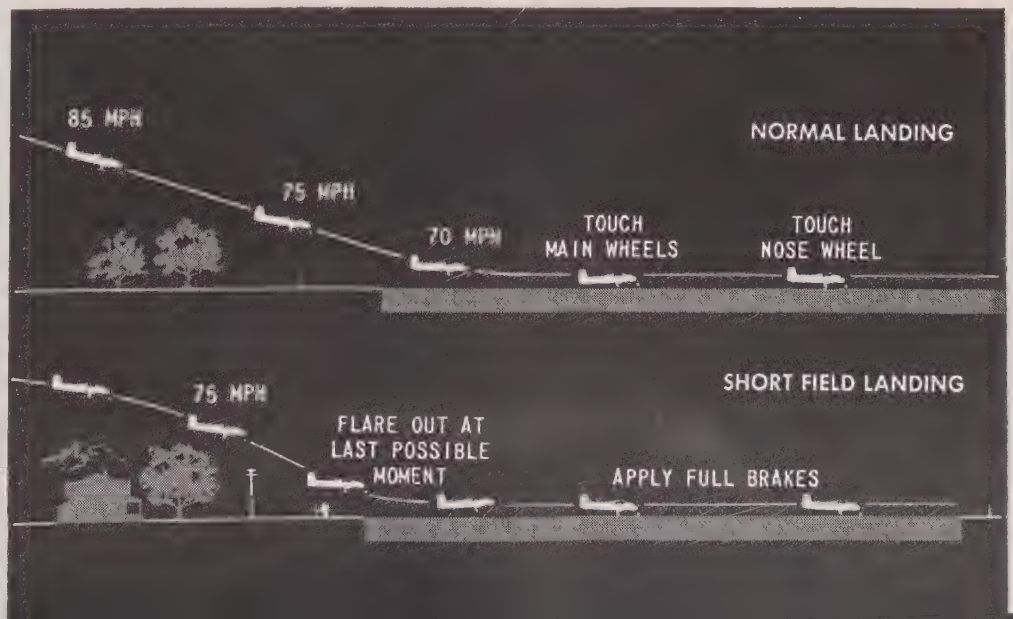
The airplane itself is conventional in design with a normal vertical fin and rudder. Actually, only two items are especially unique. Seating is accomplished with two seats, each wide enough to hold three full-sized people. Dual controls are installed in the left and center front seats.

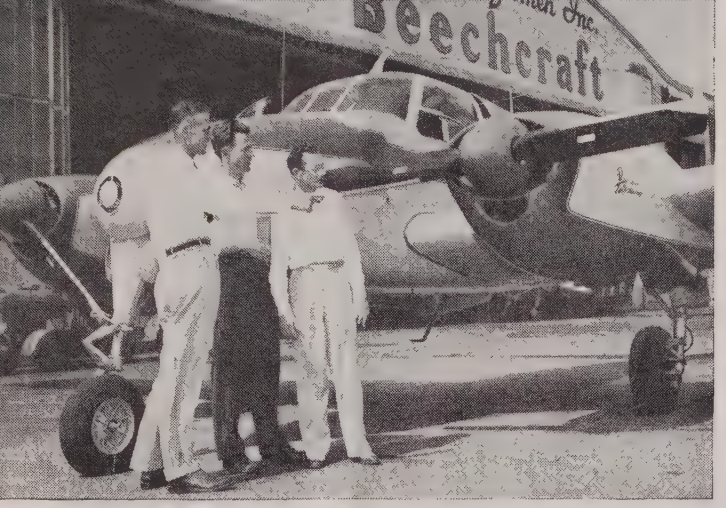
The only other unexpected item is the stainless steel exhaust stacks—looking for all the world like shiny coffee cans—that jut from the engine nacelles. These large pipes cool the engine on a venturi principle that causes the rapidly moving jet force of the engine exhaust to "induce air flow through all parts of the engine compartment evacuating the heated air through the augmenter tubes," according to the Model 50's flight manual. Anyhow, the nacelles do not have manually operated cowl flaps, yet the engines show no tendency to heat-up while climbing rapidly or taxiing downwind.

We made three different flights in the *Twin-Bonanza* for this *SKYWAYS* pilot report. The first demonstration was with the factory pilot, Norm Blake and Mather Eakes, Aviation Editor of the *Daily Oklahoman*. On this trip, we rode in the co-pilot's spot in the middle of the front seat.

Weather was a sticky 80° on the ground and the built-in ventilation system had a good chance to show its stuff. An electric blower maintains an excellent circulation of air in the cabin on the

CHART shows *Twin-Bonanza's* normal landing procedure and its short-field procedure





TWIN-BONANZA is a complete airplane. Only optional equipment is the radio and the full-feathering propellers

PLANE with its left prop feathered will trim-out hands-off at 100 mph and can climb 300 fpm on one engine

ground. This fan motor is attached to the landing gear and operates automatically when the gear is down. For winter operation, a 50,000 BTU heater hooks into the system, but we didn't need it in midsummer Oklahoma weather.

First impression of the *Twin-Bonanza* is that it is a really complete airplane. Actually, this model used for demonstration work had everything on it but the kitchen sink, so we asked the pilot what equipment was "optional" and not included in the factory price.

"All the radio equipment and the full-feathering propellers," was his reply. "Since different customers require a difference in radio installation, we prefer to let the customer choose his own. There is a 70-pound weight allowance in the 3,800-pound empty weight of the airplane.

"The full-feathering propellers are brand new and no price has been set on them as yet. They are basically the same as the regular constant-speed Beech propellers used on the *Bonanza*, with the addition of an electric feathering motor to pull the blade pitch down to 86° after the regular oil-pressure system slows the blade to 200 rpm."

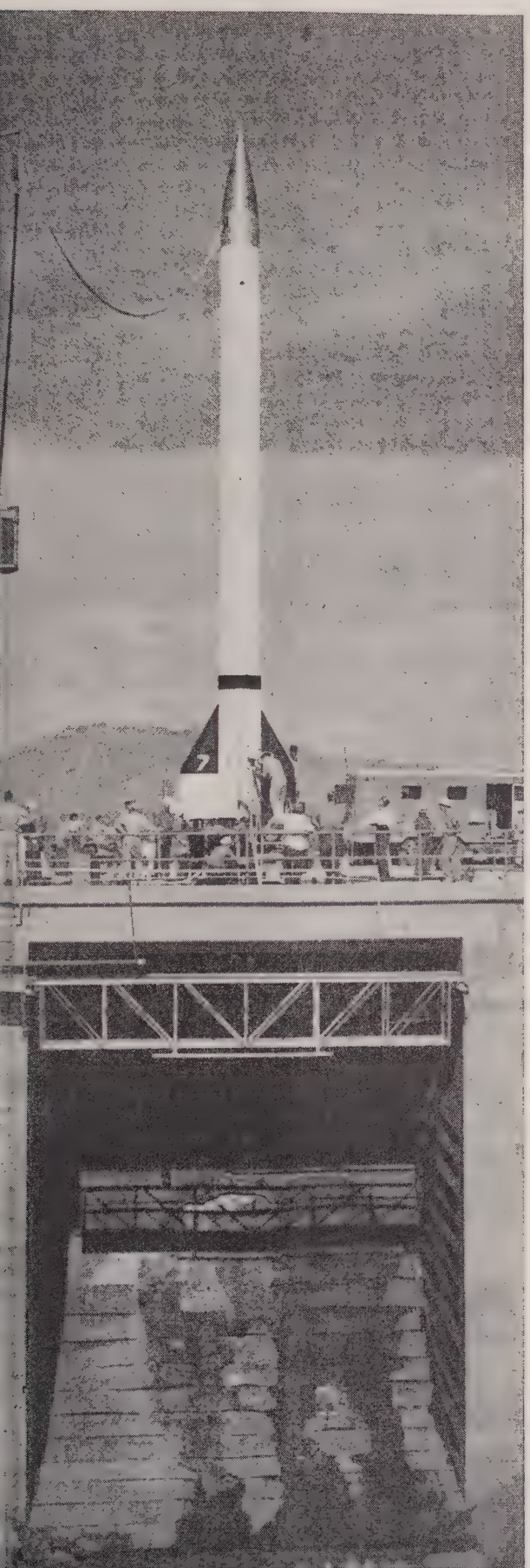
Powerplant for the Model 50 is the well-proved Lycoming G0435-C2 six-cylinder geared 260-hp engine. The engines are fitted in a bed-type mount attached to the nacelle fire-wall. The cowling is hinged at the top and the low-winged design puts the engines close enough to the ground so that normal maintenance can be done without work stands.

First stop on the 21-point pre-starting check-list is the fuel system with its selector valves mounted beside the pilot's left arm. Two tanks in each wing are arranged with individual fuel gages and a fully illustrated system of where each line goes when the valve is turned. Total tankage is 134 gallons and fuel consumption ranges from 19 to 26 gallons per hour, depending on the power setting. The main tanks should be used first, since a feed-back of three gallons per hour is piped back into these cells. Normal fuel pressure comes from geared, engine-driven pumps, while submerged electric booster pumps in each main tank are used for starting and emergency operation.

The auto-type ignition lock turns on the battery switch. Four magnito toggle switches are located at the far left of the instrument panel with matching starter buttons underneath. Primer buttons adjoin the starter but are not needed for above-freezing weather. There is plenty of power in the two 12-volt batteries connected in series,—one mounted in each engine nacelle. Each engine also has a vacuum pump for the blind-flight instruments. A gage on the panel shows vacuum pressure and a four-way valve permits a separate check of each engine, all gyro instruments and the (*Continued on page 41*)

MODEL 50 *Twin-Bonanza* will sell for about $44,995. It seats six, three in front, three in back, comfortably

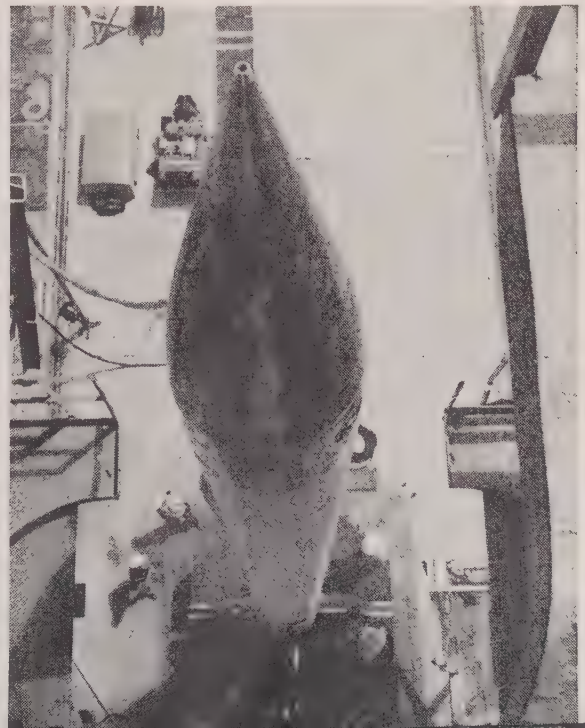
Research Rocket

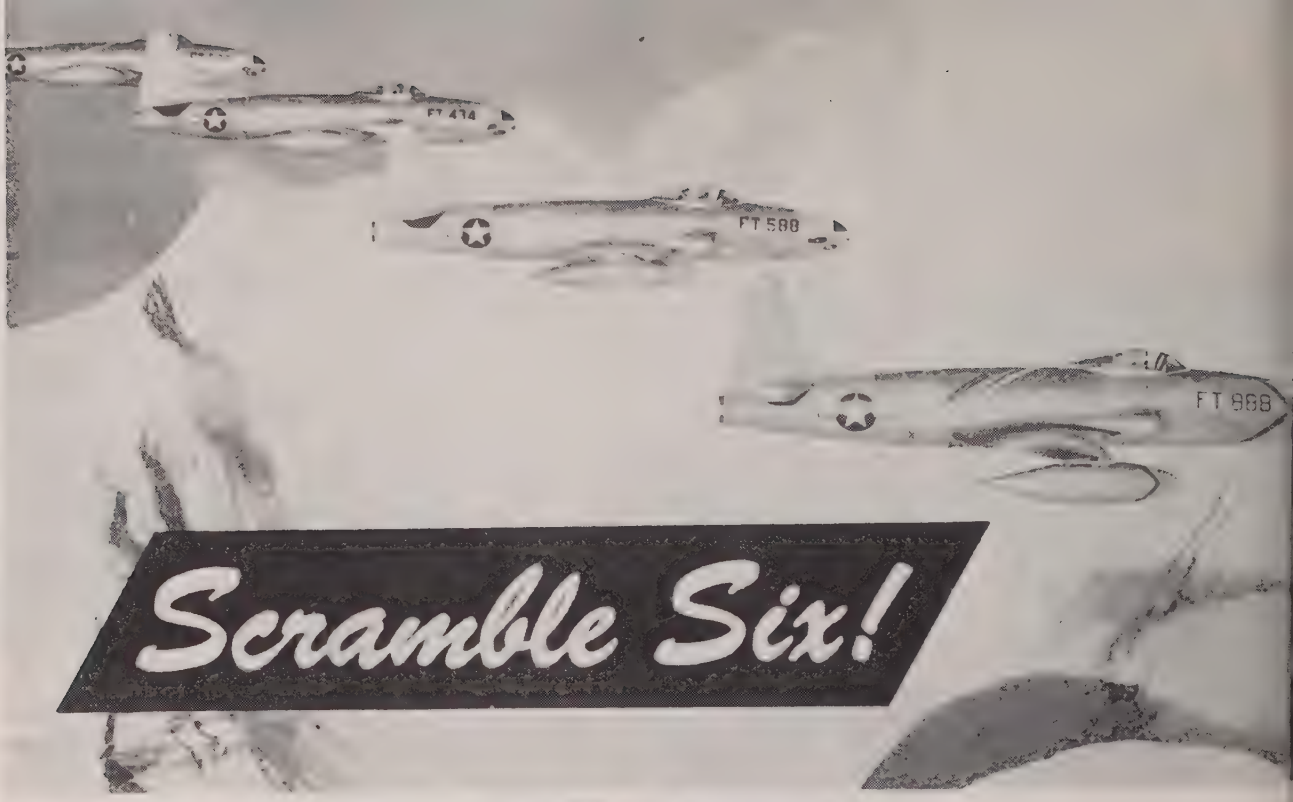


VIKING, tilted 3° to the North, was powered by rocket engine burning liquid oxygen and ethyl alcohol. When fuel tanks were full, oxygen vapor escaped from vents *(right)*. Rocket engine burned for 75 seconds, then rocket coasted

How fast is fast? The Navy's latest research rocket, the *Viking*, built by Glenn L. Martin Company, has the answer to that question. On a recent flight, the *Viking*, No. 7 of 10 to be built, reached a top speed of 4100 mph . . . that's more than 68 miles per minute or more than one mile a second! The 5½-ton, 48-foot *Viking* hit an altitude of 135 miles . . . a new world's record for both speed and altitude. The rocket's engine, burning liquid oxygen and ethyl alcohol, operated for 75 seconds, and in that time reached an altitude of 25 miles. It coasted the rest of the way to the 135-mile altitude in 4 minutes, 23 seconds. Launching site was at White Sands, New Mexico.

NEEDLE-NOSED, pencil-like rocket was set in place for launching by the gantry. Pit *(left)* absorbed intense heat



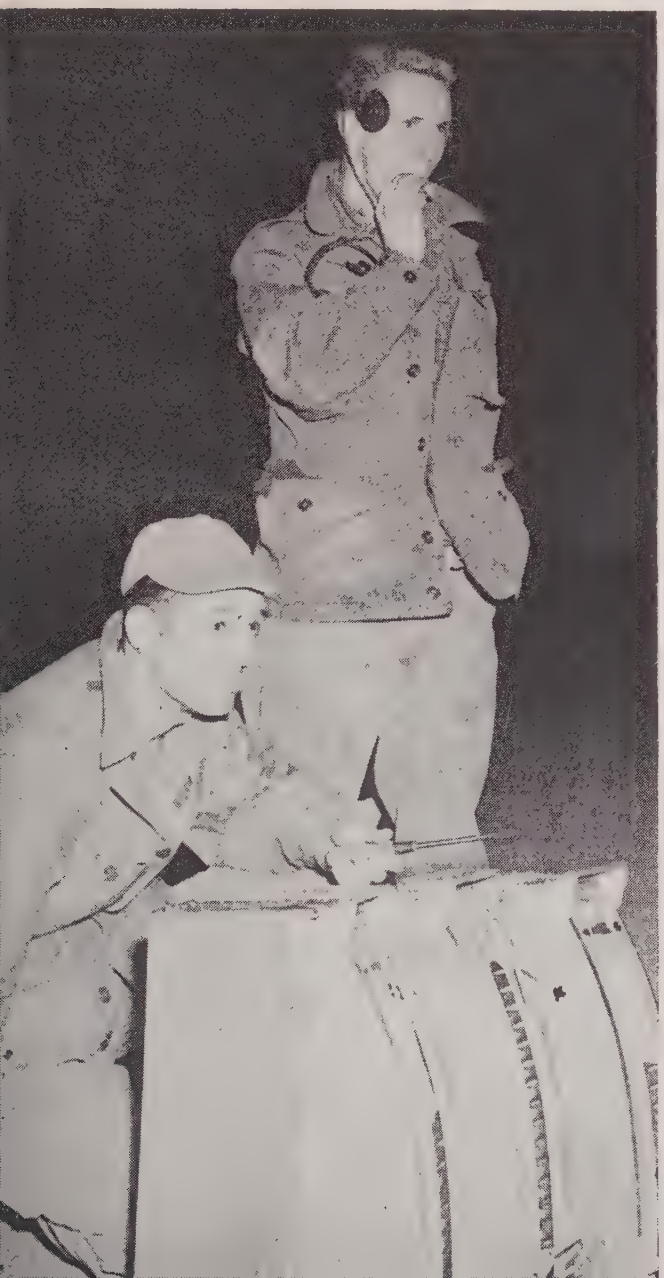


Scramble Six!

ALERT sounds and interceptor crews *(left)* rush for fighters. Seconds later AF jets are bound for the target

Interceptor crews of the Alaskan Air Command stand 24-hour guard on security from attack

RED-NOSED JETS take off, swiftly swing to the GCI-reported heading



PILOTS on alert *(above)* ease long hours of waiting by reading or shootin' the breeze. Crews are confined to ready shacks on 24-hour shifts. Ground crewmen wait on the line *(left)* for the "scrambled" jets to get back

By K. G. HAMPTON

Captain Bill Davis, of Aurora, Missouri, was drinking his fifth cup of coffee in the ready shack along the Alaskan runway when the phone rang. He picked up the phone to hear two words from group headquarters, "Scramble six!"

Swiftly, he turned and shouted the order to the pilots and crewmen on alert. To men of Alaska's fighter-interceptor group these electric words mean "six planes take off and intercept an unidentified aircraft." Somewhere over one of Alaska's hills, the aircraft's image had been picked up on a radar-scope.

With no words, and with practiced motion, six crews grabbed flying equipment and raced toward the red-nosed interceptors parked outside their alert shacks. Seconds later the jets were rising smoothly in formation and speeding toward a target yet unknown.

The planes swung to their heading as the flight leader received the instructions from the radar ground site. "Red dog leader, take up a heading of two three zero. Angels two zero."

"Roger, two three zero."

As the close formation climbed steadily on course toward 20 thousand feet, the confirmation went back.

(*Continued on page 43*)

TWO-WAY STRETCH

When engineers come up with a good airplane, it's sure to grow bigger

By DON ARMSTRONG

GOOD airplanes grow big and fat with age. Virtually every airplane that has been in production any length of time has had growing pains. The Super DC-3, the *Super Constellation*, the DC-6 and DC-6B, the T-33 and the F-94—all are bigger and heavier versions of well-established airplanes.

The first step in the two-way stretch of any airplane begins forward of the firewall. As larger, more powerful engines become available, engineers seriously consider enlarging their brain children.

When the Wright turbo-compound (C-18DA-1) engines rated at 3,250 horsepower for take-off became available, giving a 750-hp per engine boost, the decks were cleared for the *Super Constellation*. Actually, a 13-foot larger "Connie" was considered back in 1942, a year before the original prototype flew, but no engines were available then and the project was stymied.

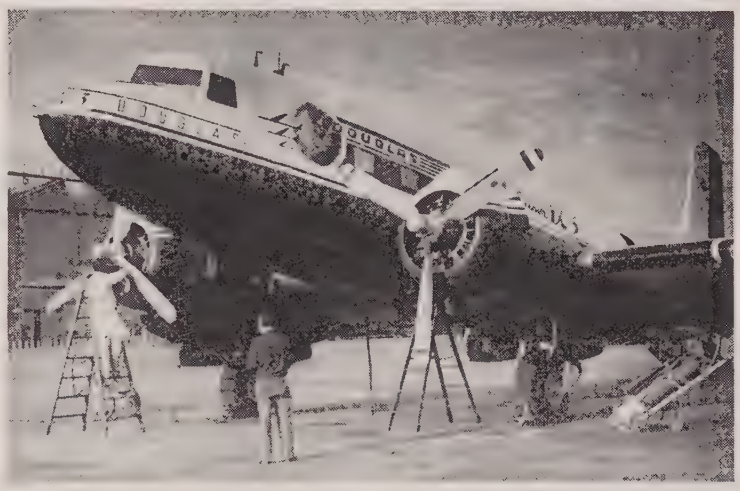
"It is no joke that the *Constellation* got a two-way stretch in its fuselage modification," says Robert E. Reedy, manager of the Sales Engineering section at Lockheed. "The length was increased approximately 18.4 feet (one-way stretch) and the new sections were introduced just fore and aft of the wing beams at approximately the widest and highest portions of the fuselage, and thus the cross sectional size was appreciably increased through most of the cabin length (two-way stretch)."

Actually, it is much more economical to re-do an existing proved design than to start from scratch and build a completely new piece of machinery. Even at that, over

LOCKHEED F-94 *(left)* is the result of a two-way stretch applied to the T-33 which is trainer version of the fleet and famous F-80 *(opposite page, top)*

SUPER CONSTELLATION *(foreground, below)* is enlarged, more powerful development of the tried and proved Lockheed *Constellation*, shown below in background

PERFORMANCE of the F-80 was improved by "stretching" it. T-33 trainer was result. Then it was developed to F-94



SUPER DC-3 is larger, improved version of the well-known DC-3. Similarly, the DC-6 was an outgrowth of the World War II workhorse for the AF, the C-47

600 engineers worked at one time on the various phases of the "Super Connie."

In outward configuration, the "Super Connie" (L-1049) is identical with the original model, except for the 18.4 feet added to the fuselage and a slightly larger fin area to handle the extra power. The prototype "Super Connie" was rebuilt from one of the first *Constellations* to come off the assembly line. This plane had been purchased by Howard Hughes for experimental work and never "plushed" inside. Lockheed re-purchased the airplane, inserted two sections, and used it as a flying test stand for the larger finished product. Its purpose has been to collect flight-test data on the stability and control of the new configuration—information that was in many ways superior to wind-tunnel data and far less expensive to obtain. One larger engine was installed in the Number 4 nacelle to check out the mounting, but the remaining engines were of smaller horsepower.

What governed the choice of 18.4 feet in added length? An even 18 feet would not have provided sufficient leg room for the last of five extra rows of seats. The airlines, naturally, are primarily—and economically—interested in cost per seat mile.

"Stretched airplanes tend to become more efficient," according to Lockheed's Bob Reedy, "since equipment items and accessories are more or less standard and usually have sufficient capacity to take care of large or medium airplanes. Therefore, equipment weight tends to be a smaller percentage of the gross weight as the size of the airplane increases.

"It is particularly advantageous to increase the size of an airplane initially designed for a relatively low gross weight and moderate payload, since many of the parts of the original airplane have to be designed on a 'minimum thickness' or 'minimum size' basis rather than a structural-strength basis. For instance, sheet metal parts must carry a certain minimum thickness, regardless of the stress they carry, to avoid damage in handling, installation, service use, etc." *(Continued on page 46)*

flying the BOOM

CLANCY'S VIEW—This is how "Flying Boom" looks to the tanker operator *(below, right)* who operates boom via controls in refueling pod. He moves boom up, down, sideways, extends or retracts it. Note the vee-shaped "ruddevator"

By MARVIN MICHAEL

Flight Test Pilot, Boeing Airplane Co.

FILLING up your automobile's gas tank isn't much trouble any more, what with automatic pumps and pressure devices that shut off fuel flow for you when the tank is full. In fact, taking off the gas cap, putting the hose nozzle in the neck of the tank and keeping a constant pressure on the gas-flow lever require, it seems, even less effort today than washing the car's windshield.

Actually, the steps involved in aerial refueling via the Boeing-designed Flying-Boom method are—in many ways—no more complicated. Automatic pumps transfer the gasoline under greater pressure, the pumps control the rate of flow—and the gas tank cap is operated by push button! Refueling in the air under these circumstances is more difficult simply because it is harder to insert a gas nozzle in the neck of a tank when both the gas station and receiver are moving forward at modern airplane speeds and independently are subject to the additional motions of pitch, roll and yaw.

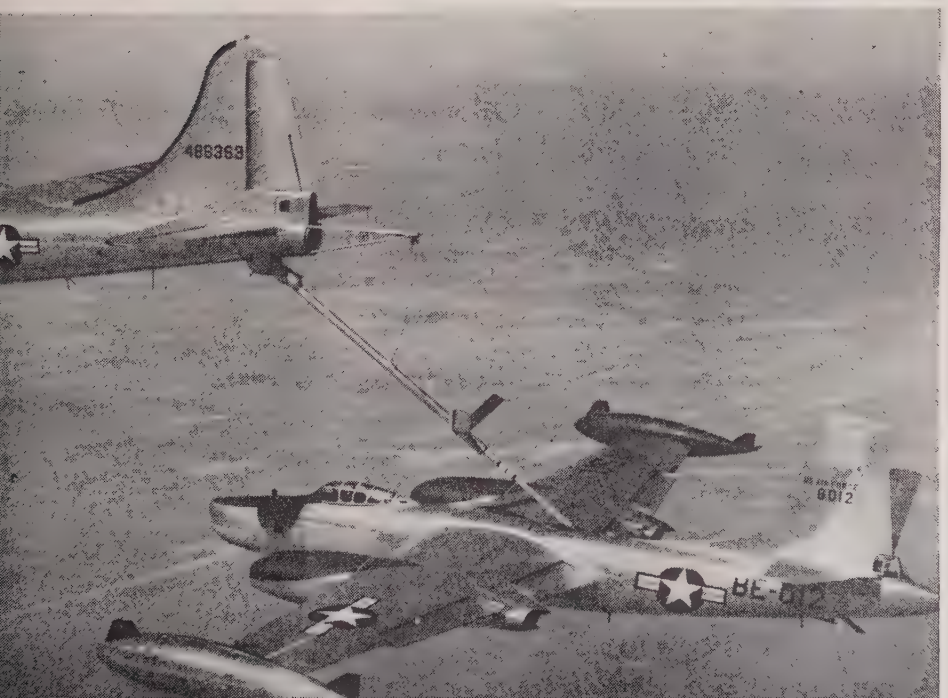
Under the Flying-Boom method, the tanker may be either a Boeing KC-97 *Stratofreighter* or a modified KB-29 *Superfortress.* Military security prevents a complete listing of receiver aircraft but four which can be mentioned are the Boeing B-47 *Stratojet,* the B-50 *Superfortress,* North American RB-45C *Tornado* and the Republic F-84 *Thunderjet.*

Examining the tanker aircraft, first we find that the bulk of its fuselage space is occupied by the gas tanks which will be used in refueling. These are semi-permanent fixtures in the KB-29 and auxiliary equipment in the convertible KC-97 which can be utilized also as a troop, cargo or hospital transport when the refueling gear is removed.

Additional fuselage space in the two tankers is occupied by pressure pumps and selector valves which permit gasoline or jet fuel to be pumped from either the refueling tanks, the tanker's own operating fuel system or simultaneously from both.

The Flying Boom itself is identical on the two airplanes. It is made up of two telescoping metal pipes and is attached at its base to the underside of the tanker fuselage near the tail by a yoke and trunnion attachment that permits movement in elevation and from side to side. The boom operator, located in what would be a tail-gunner compartment at the

FLYING BOOM—This is close-up view of Boeing-developed retractable flying boom, here installed on a KC-97A *Stratofreighter.* Pod on the fuselage houses boom controls and operator ("Clancy"). The B-17 has been tanker-converted



TORNADO—First jet bomber to be refueled in flight was the RB-47C *Tornado,* shown here receiving new load of fuel via Boeing Flying Boom. Other planes equipped as Flying Boom "receivers" include F-84G, B-47 and B-50

base of the boom, controls movement of its free end by means of a conventional pilot's stick connected to two control surfaces known as "ruddevators" which extend from the boom near its nozzle.

Action of the slip stream on these surfaces provides the force necessary to lower, raise or swing the boom from side to side. Telescoping is performed by means of a reversibe hydraulic motor which is geared to a chain and cable loop attached to the sliding section of the boom.

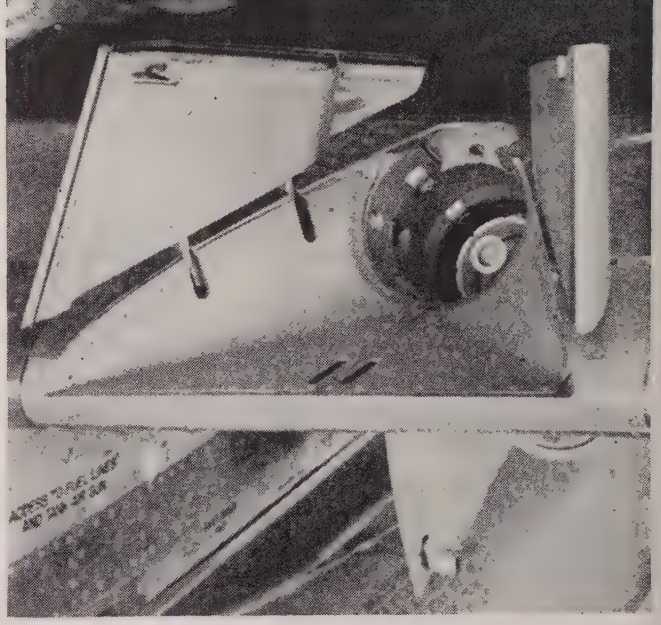
When not in use, the boom is trailed in up position, bracketed near its free end beneath the tail of a KC-97 and attached in a similar manner to a metal framework extending beyond the tail of a KB-29.

Refueling equipment in the receiver aircraft is relatively uncomplicated. It consists principally of an extension of the airplane's fuel-system plumbing to permit reception of fuel at a central point. Small remotely controlled doors and a slipway are provided at this inlet to accommodate the Flying Boom's nozzle.

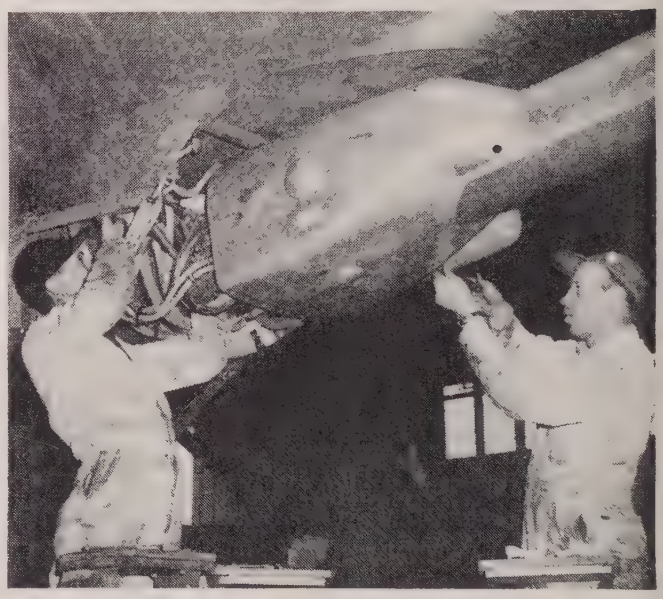
Because of the high rate of gas flow which is maintained by the tanker's pumps, the receiver's entire fuel system is built to withstand the resultant surge pressures. When the gas tanks are full, and pumping stops, the surge pressure is greatest.

A normal daylight refueling contact is begun when the tanker boom is lowered from stowed position and the receiver slides into formation below and slightly behind the trailing boom of the tanker. At this point the tanker pilot relinquishes a great deal of his initiative to the boom operator and devotes his principal attention to flying a straight-and-level course at a steady airspeed to make the formation job of the receiver pilot and boom operator more simple.

Each of these men has (*Continued on page 42*)



THUNDERJET—The F-84G is coming off production lines equipped with receptacle *(above)* for the flying boom



QUICK CHANGE—Maintenance mechs can convert a *Stratofreighter* into a flying tanker in 6 hours 10 minutes. Mechs *(above)* complete the job as the flying boom gets into position in tail of the C-97

RANGE BOOST—B-47 jet bomber gets added range via Boeing mid-air refueling system. Here the sleek B-47 is hooked up to a double-deck Boeing KC-97A *Stratofreighter* tanker for a fuel load

SEAPLANE PILOT Schoepflin slides dolly under his plane and between plane's floats

Docking Dolly

Tired of always having to hunt up someone to help him beach his seaplane, Art Schoepflin, of Brooklyn, N. Y., devised his own one-man docking dolly. With it, Art is able to bring his Luscombe up the ramp by himself, and launch it, too. To beach his seaplane, Art taxies up on the base ramp. Then he gets out and places the welded channel iron dolly between the floats, lining up the black lines marked on the float cross bars. Via an hydraulic jack, he lifts the dolly's bars which in turn lift the plane off the ground via the floats' spreader bars. The dolly handle is then slung and tied between the floats to keep the dolly moving straight. Art climbs back into the plane and "guns" it up the ramp. To keep the dolly from rolling backward, wheel chocks are placed behind the dolly's rear wheels. Dolly cost Art just $200.

HYDRAULIC JACK raises dolly's lifting bars under spreader bars of the floats *(above)* thus lifting seaplane clear of the ground. Lifting bars are moveable sideways and fit snugly under floats' spreader bar couplings

DOCKING DOLLY is made of welded channel iron mounted on four 12-inch rubber-tired wheels. Tips of the dolly's lifting bars are rubber-covered to prevent scratching or slipping. The dolly weighs about 300 pounds, cost $200

FLIGHT PLAN—Cadets Dale Smith *(left)* and Edward Phillipp map their course with instructor Capt. Butler *(center)*

Cross-Country Cadet

Probably the most enjoyable part of the Aviation Cadet's training is the cross-country flying. Several X-C's are made, and often times from the base to the cadets' home towns. Not too long ago, two Vance AFB cadets made a cross-country trip to Cleveland, Ohio. With them in the B-25 bomber was their instructor, Capt. Robert A. Butler, but the two cadets, Dale Smith and Edward R. Phillipp, did much of the "work." Capt. Butler was the overseer. The flight to Cleveland took the boys over northern Oklahoma, Missouri, Illinois, Indiana, and Ohio, with a stop at Dayton's Wright-Patterson AFB and a stop at Selfridge AFB, Michigan. The glad-to-be-home cadets were in Cleveland for the weekend.

CAVU—Weather Officer, Capt. Kubica, briefs Cleveland-bound boys and reports weather okay all along the route

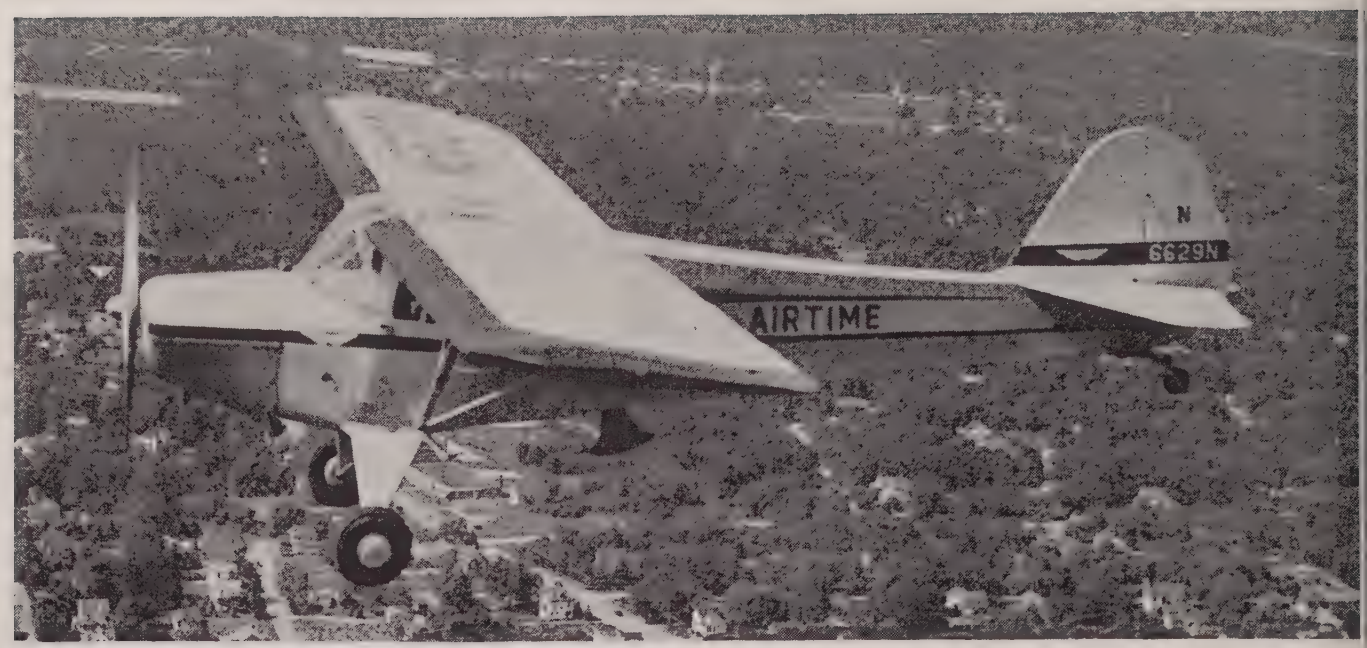
TAKE-OFF—The B-25 checked and all set to move out to runway, Cadet Phillipp waves goodbye to his wife

FLIGHT—Winging their way toward Cleveland, Cadet Phillipp is at the controls *(right)*, with Capt. Butler co-pilot

HOME—When the Vance AFB B-25 landed at Cleveland, Cadet Phillipp's mother, father, sister were on hand at field

LOOK-SEE—As part of the fun the boys look over a P-63 which was parked at the airport. As a civilian, Cadet Smith *(on wing)* worked on planes like this one that was entered in the Cleveland Sohio Air Race back in Sept., 1947

VANCE AFB—From the nose of their B-25, the boys get a good look at home base. Trip back was uneventful except for bad weather near Selfridge AFB. Capt. Butler was forced to circle Ann Arbor for 30 minutes changing to IFR



NEW FLIGHT TEST calls for cross-country planning and a flight according to that planning, plus in-air alternate field course plotting. Maneuvering part of test includes pylon turns, slow flight, 720's, climbing turns

Flight-Test Changes

By V. A. PREVETTE

As PREDICTED a few issues back, a brand new private-pilot flight test has been evolved. New methods of stall-recovery, new cross-country training, pylon flying, and added take-off and landing procedures are now required of the aspiring and perspiring ticket applicants.

Heretofore, CAA asserts, too much time has been wasted on training students to merely pass the flight test. The new form is aimed at teaching the student skills he will be able to use *after* the test and all through his flying career. And the confidence gained in the private-pilot's cross-country training will result eventually in a boost in plane sales and plane use, the CAA maintains. In a sense, the flight course becomes a sales session for the airport and its services.

Written Exam

As a part of the new program, CAA now requires a longer, more thorough-going written exam. The written test is 50 questions in length and covers navigation, weather interpretation, use of radio and light gun in traffic control, CAR, and general operation. These questions are taken directly from the CAA's brand new booklet "Questions and Answers for the Private Pilot." This useful 200-question booklet sells for 15¢ and can be obtained from local airports or the Government Printing Office, Washington 25, D. C.

APPLICANT for private ticket needs 15 hours dual, five of which must be cross-country, and 20 hours of solo

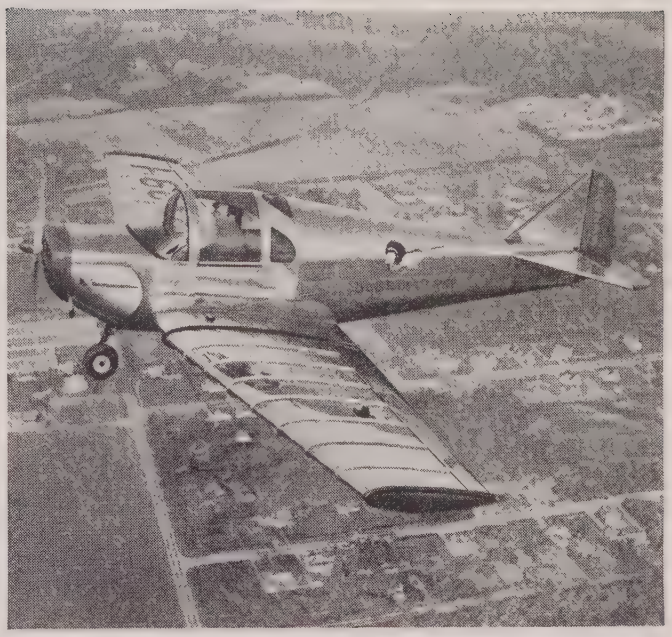
Only drawback for private applicants as far as the written part of the test is concerned is that now, instead of instructors and examiners giving the written, the test must be taken either at a CAA office or from a CAA Safety Agent when his itinerary brings him around to the local airport. Both times will be during week-day working hours and could cause considerable inconvenience to the applicant. A movement is presently afoot in Washington, however, to get CAA to allow sealed exams, notarized statements or some appointee system to be used to enable working students to take the test after hours or on weekends. True, some change was needed in giving the exam, for too many times instructors either forgot the quiz entirely or sat at the student's elbow dealing out broad hints, probably because the little exam looked so insignificant on its mimeographed sheet.

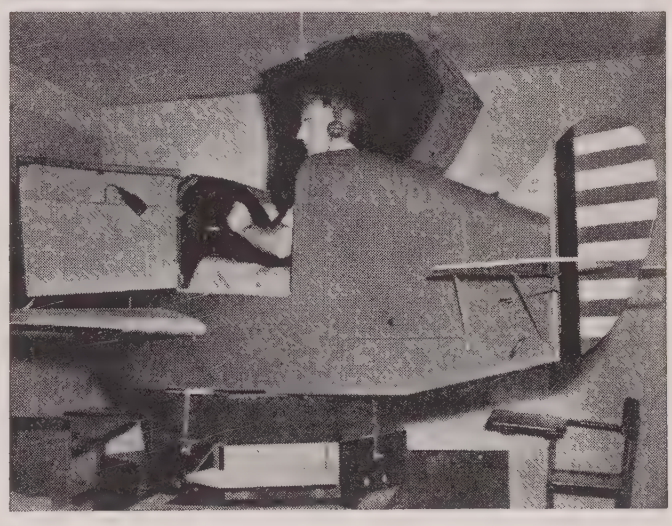
Flight Test

The new flight test will cause a high number of rejections at first, the CAA tells us. However, as training gets into the swing, not only will rejections decrease but students are expected to enjoy the course more and to get more useful info from it.

Cross-Country: Major change in the test is the addition of a cross-country planning and flying demonstration.

First, the applicant for a private certificate will be asked to plot a course (*Continued on page 56*)

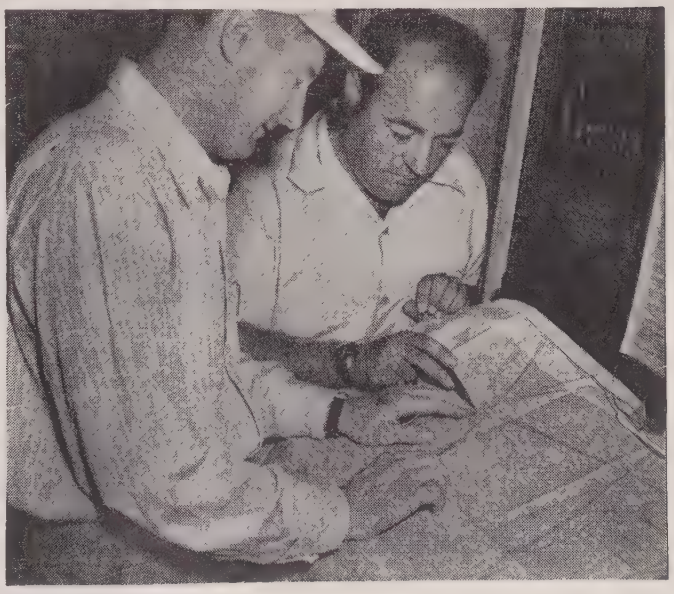




COMMERCIAL ticket applicant must show proof of five hours of night flying, 10 of instrument, some in Link

CAA BOOKLET "Questions and Answers for Private Pilot" is available from Govt. Printing Office for mere 15 cents

PRE-FLIGHT preparation is a "must" for license applicant: plot course, note check points, weather report, etc

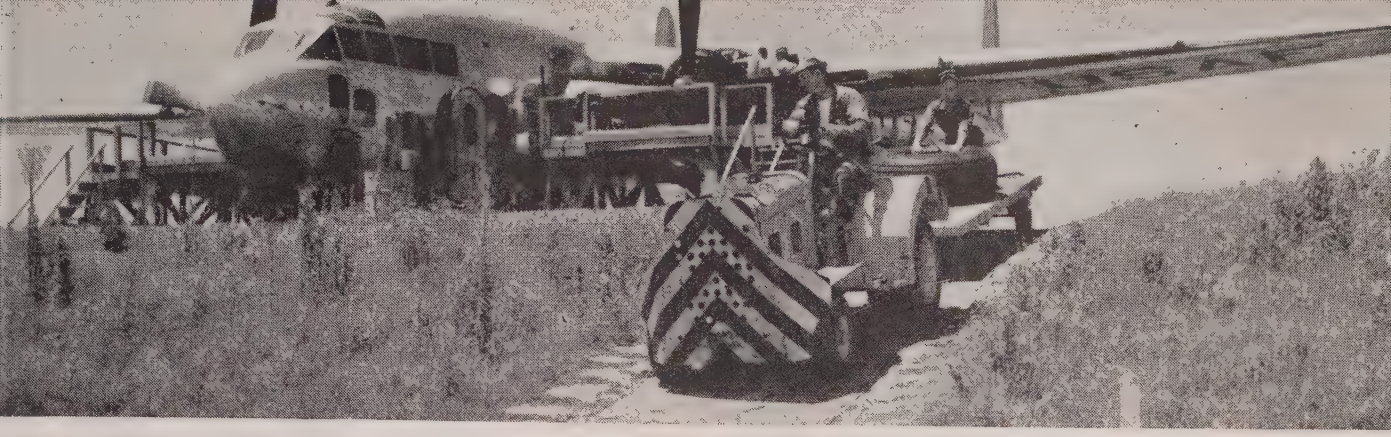


PAYLOAD of troops, equipment is dropped to cut off Reds in Korea *(above)*. These same TC operations are being readied for possible need in Europe

COMMANDING GENERAL of 18th Air Force is Maj. Gen. Robt. Douglass Jr. *(above)*. TC units of 18th AF have been sent to serve with Gen. Eisenhower's forces

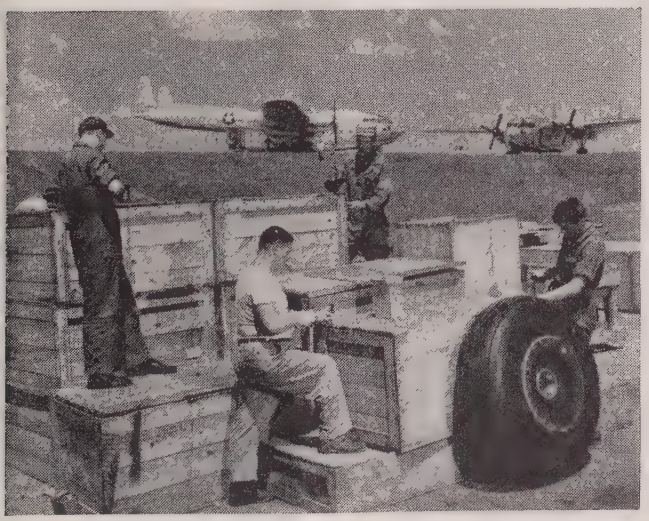
TC is Ready

Troop Carrier units can deliver everything to front-line action but the battleground itself



MEMBERS of 433rd Troop Carrier Wing were recalled to active duty from reserve status to supplement North Atlantic Treaty Organization in Europe. Men underwent nine-months training with C-119's at Donaldson AFB, S. C.

TROOP CARRIER planes like the C-119 can deliver Army's biggest gun, the 155-mm Howitzer, shown here being loaded *(above)* aboard *Packet*. Pilots, crewmen *(below)* pitched in to help move 433rd Troop Carrier Wing to Europe



"IF WE can't deliver it, you're better off without it." That's the slogan of the 67th Troop Carrier Squadron and it just about sums up the idea behind the rapid-paced training program for Troop Carrier units of the new 18th Air Force.

Troop Carrier is being trained to deliver everything into front line action but the battleground itself.

A whirlwind program of expanded airlift operational versatility in nine months has called eight reserve wings to active military service and furnished the first Air Force unit to report from the United States to duty with Gen. Eisenhower's Atlantic Pact forces in Europe.

The 433rd Troop Carrier Wing left in July for service with Gen. Ike's North Atlantic forces after flying their C-119 Fairchild *Packets* through the nine-month training schedule designed to prepare it "to deliver American fighting forces—fully operational—where needed, when needed."

Seven other reserve Troop Carrier wings are grinding through the same program and the 18th Air Force's commanding general, Maj. Gen. Robert W. Douglass, Jr., says they all are fast approaching the "ready" state.

The busy 18th commander has personally sparkplugged his new air force by flying more than 100 hours and 20,000 miles in two months, checking operational techniques of the wings which are spread from Portland, Oregon, as far south as Miami, Florida, and east to Mitchel Air Force Base, New York.

General Douglass, who returned from Europe as Chief of Staff, USAFE, to take command of the 18th Air Force, predicts a hardworking future for his organization.

"Troop Carrier's role in present day military structure requires an air arm of flexibility and versatility.

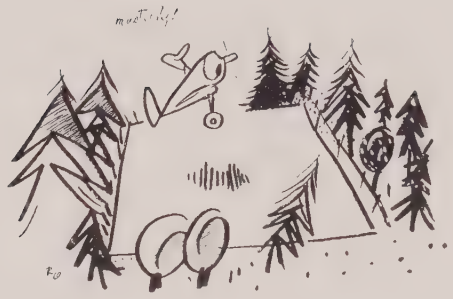
"The wide range of combat action demanding Troop Carrier participation—air dropping of strategic equipment, delivery of operational fighting forces, supply, evacuation—means that our aircraft and crews must be capable of continuous mass flight through any and all types of weather, terrain and conditions.

"This is the target of our training," the General explains. *(Continued on page 40)*

DILBERT

By S. H. Warner and R. Osborn

1.



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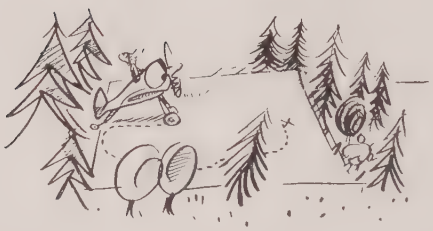

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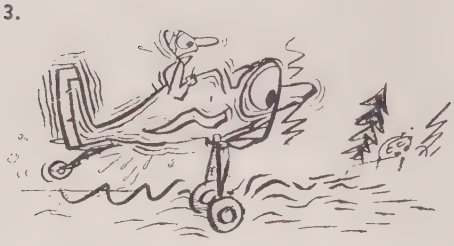


4.

Short-Field Take-off—Dilbert had prop trouble the other day; his engine konked out and wouldn't turn it over any more. Three thousand feet altitude didn't give him much time to maneuver, but he spotted a small clearing and stalled himself into it without mishap.

Dilbert was still patting himself on the back over this snappy landing when he discovered that the engine had stopped because it wasn't getting any gas. (He had merely neglected to turn a certain little valve in the cockpit which would have shifted gas suction from the then empty tank to a full one.)

Never one to cry over a spilled airplane, Dilbert made a mental note to watch his gas more closely next time; then proceeded with the business of getting back in the air. He taxied to the fence at the downwind end of the clearing, swung around, and poured on the soup. But the airplane didn't accelerate as fast as usual.

Bumping along at mid-field, he had a spasm of worry, but he had *confidence* in his plane. "She'll make it," he wishfully murmured. She did too; cleared the fence by a good foot—but not the scrub oaks on the other side.

That's about all; Dilbert will soon be able to fly again, but not in that plane.

* * *

Even Dilbert should have known that you

(*Cont. on page 58*)

"No matter how you slice it, walking into a prop is a Dilbert!"

BUSINESSMAN H. D. McDonald flies over 900 hours a year on business. He uses his *Bonanza* for weekly trips to Vancouver, B. C.

Pioneer... by Plane

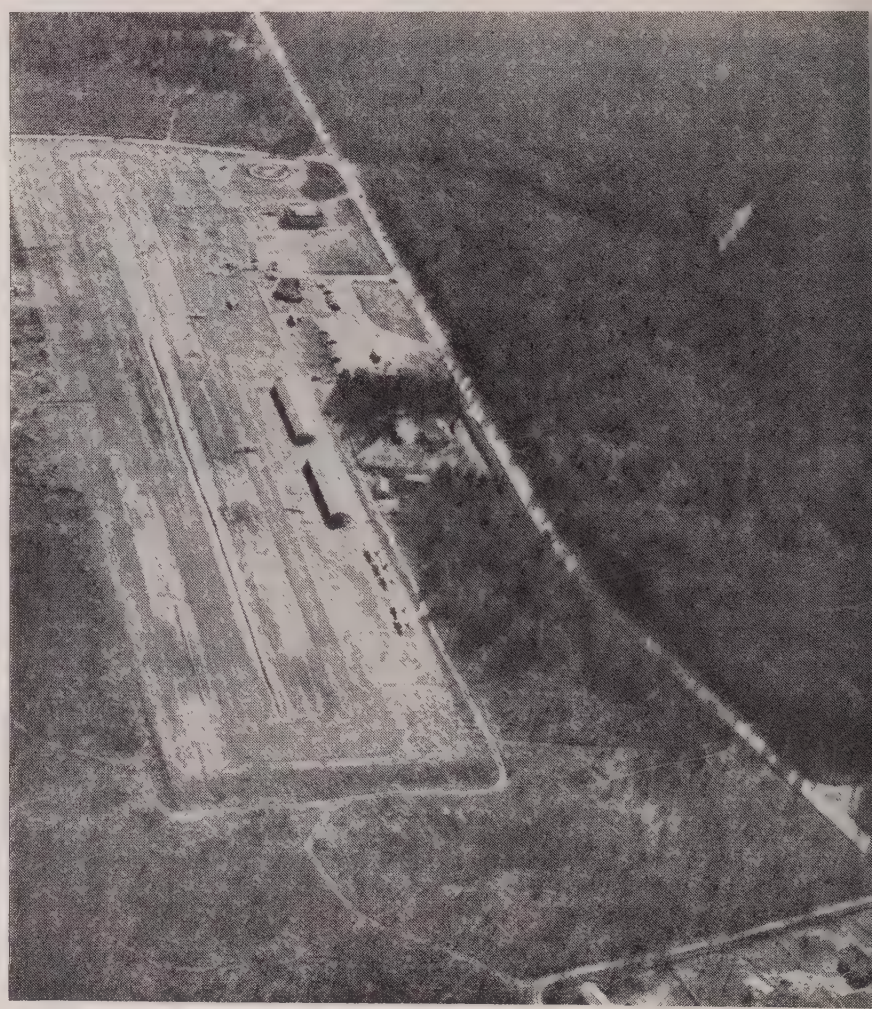
Pioneer dealers in saws carried their hand-powered products west by prairie schooner or around the Horn on sailing ships. Today, H. D. McDonald, distributor of a modern chain-saw, reverses the process to fly his product south and east around the United States.

With headquarters in Seattle, H. D. McDonald is the U. S. distributor for I. E. L. (Industrial Engineering Ltd) power saws, oddly enough called "Pioneer" by the firm in Vancouver, British Columbia, which manufactures them. Piloting his own Beechcraft, Distributor McDonald flies several hundred hours a year on business . . . and has flown over 900 hours on such trips in the past 18 months.

Without the almost-daily use of his planes it would be impossible for McDonald to carry on business. He uses his four-passenger *Bonanza* for weekly jaunts to company headquarters in Vancouver, B. C. (he makes 48 to 50 such trips yearly), and to various subsidiary agencies along both coasts, in the south and in Alaska.

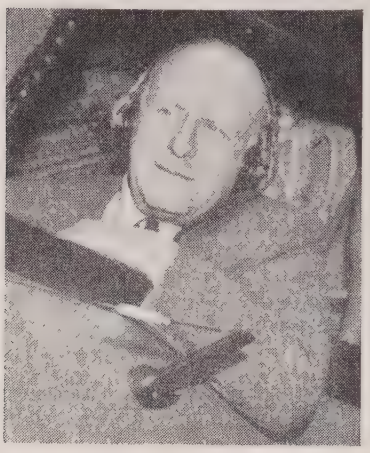
The fact that McDonald is as expert at piloting

HOME BASE for McDonald's business flying operations is the North Seattle Airpark



By IRVING PETITE

EXEC FLYER H. D. McDonald makes 50 business air trips a year



GRUMMAN GOOSE was purchased by H. D. McDonald and Howard Keeler primarily as pleasure plane for hunting, fishing

as he is astute in business is shown by his record of more than 5,000 flying hours without a mishap. In addition to the obvious time-saving in flying, there's a save on the nervous system, for H. D. much prefers the ease of flying to the wear and tear of driving, especially in the overcrowded areas of the West Coast states.

McDonald flies to meet with new dealers in the Carolinas or Maine. Bruce Milbourn, manager of the Seattle office, may go along in order to demonstrate the falling and bucking ability of "Pioneer" saws on trees in Louisiana swamps. A. E. McDonald, H. D.'s cousin and a mechanic at the Seattle office, often accompanies him on trips to logging camps where emergency repairs are required. Saws and spare parts are flown to out-of-the-way points where conventional freight methods are either not fast enough or do not reach at all.

A typical day will see McDonald breakfast at home, fly to Susanville, California, Coos Bay, Oregon, or some other business point, and then fly home again for dinner.

The trip to Susanville, for example, has on occasion taken him two days by car with accidents lurking at every bend of the road. With planes it's different: McDonald hasn't had an accident in his years of flying, "and I don't expect any," he grins. He owes his safety record to being careful and having his equipment always in topnotch condition. "When the engine shows the slightest indication of wear or whenever any difficulty develops," he says, "the engine should be taken down and overhauled." Most flying mishaps are avoidable, he believes, and his own record testifies to that.

FLYING BUSINESSMAN McDonald goes over air charts before Goose trip to Alaska

All maintenance on the *Bonanza* is done by Elvin T. Edwards who operates at the North Seattle Airpark where the plane is hangared. The Airpark is a new field, located on a hilltop between Kenmore and Kirkland, Washington, just a few minutes drive from McDonald's Lake Washington home.

Edwards has been in aviation the past 10 years, having served as an aviation flight engineer doing test hops for the Air Force during the second World War. He has been at the Air- (*Continued on page 44*)

COMMISSIONER Lowe *(center)* is "on the job" via his Stinson

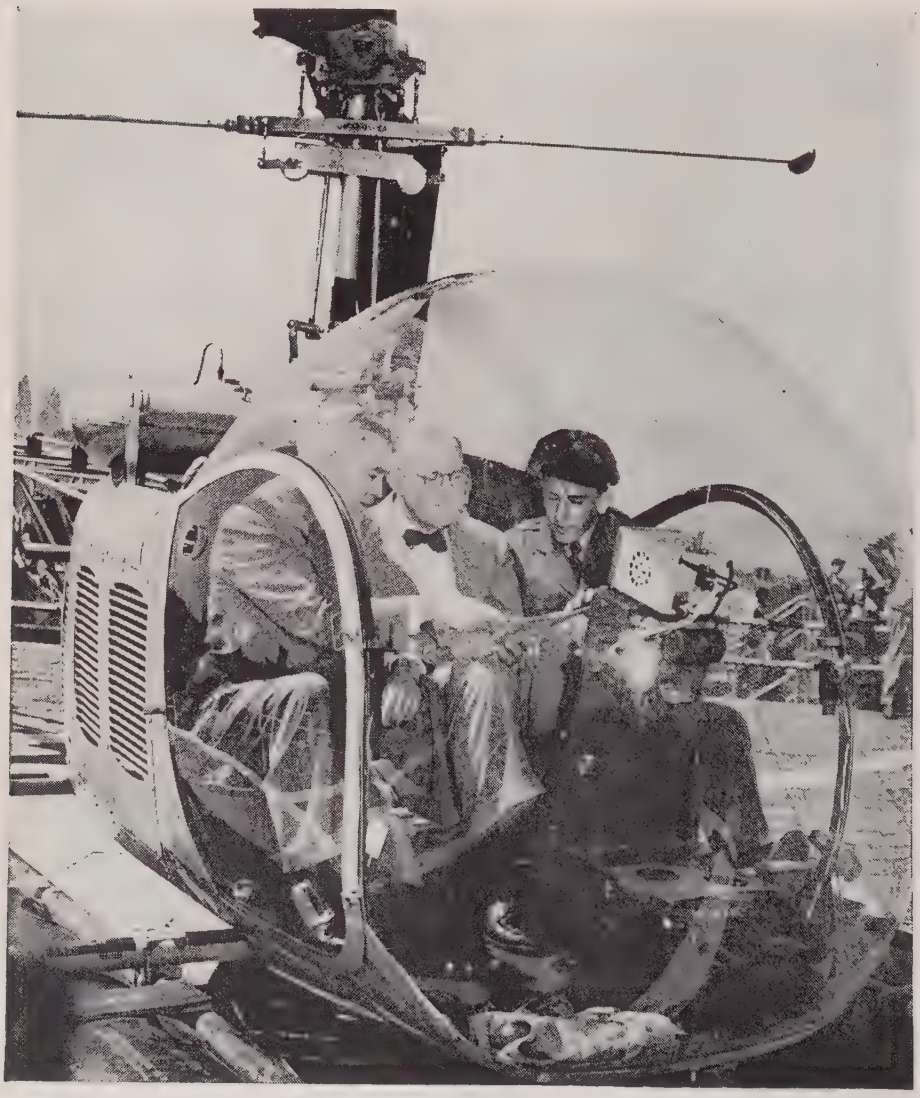
Flying Commissioner

Port of Authority Commissioner finds his airplane a "persuader"

By JEFF LYON

When the Port of New York Authority's helicopter made its maiden hop from midtown New York to Newark Airport recently, it was highly appropriate that Commissioner Donald V. Lowe was aboard as the newly dedicated eggbeater's first passenger on this very important first flight.

Mr. Lowe, a 60-year-old grand-dad who learned to fly at an age when most men are getting tired of driving their own automobile, is the only one of the 12 Port Authority commissioners who possesses a



DIRECTOR Tobin *(left)* and Commissioner Lowe confer with Pilot Ted Leopold on route Port Authority's new helicopter will fly on its first business trip to PA facilities

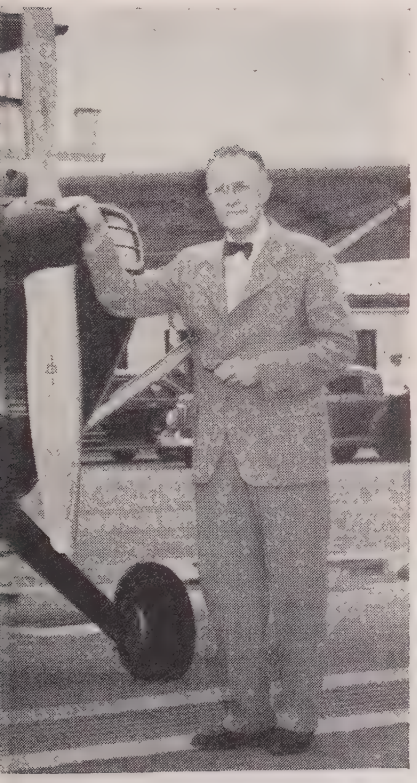
BUSINESSMAN-PILOT Lowe *(below)* makes daily use of his Stinson for both Port Authority business and his Lowe Paper Company business. Plane is kept at Teterboro

PA HELICOPTER made its inaugural flight from a platform atop the Port Authority Building located in mid-Manhattan

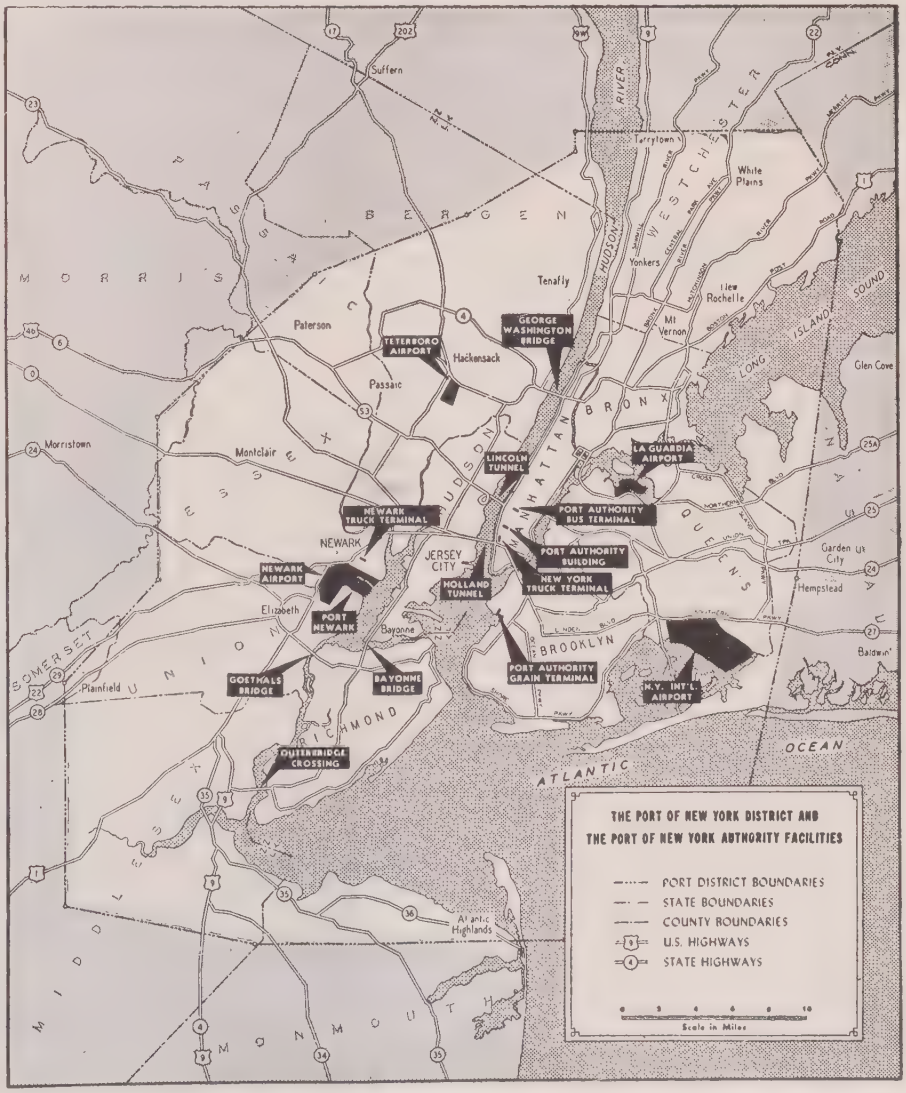
pilot's license and a deep interest in aviation.

More than that, he flies his own Stinson. His presence on the Port Authority should be reassuring to any pilot who might have the mistaken impression that the PA is a bunch of non-flying bankers, guided by experts anxious to run private planes right off the map.

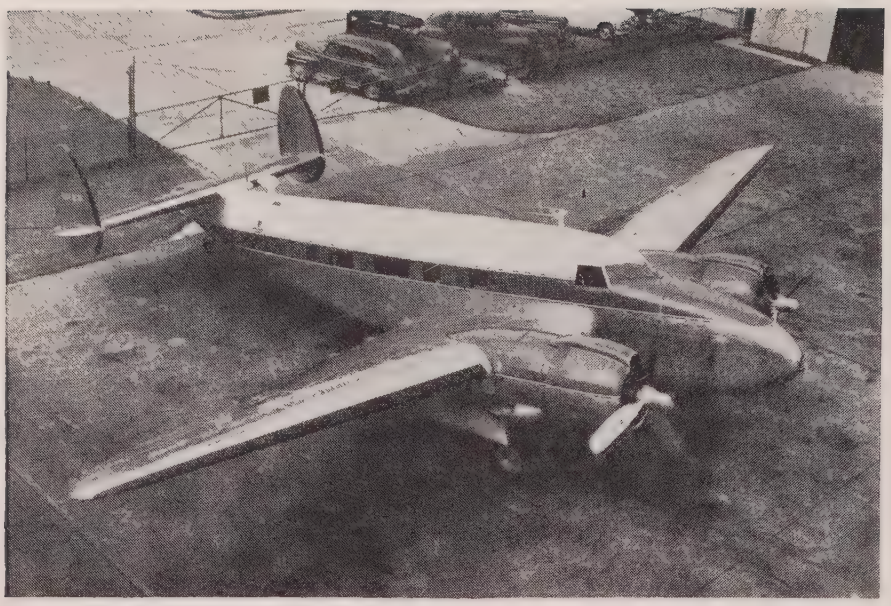
The flying commissioner is an unusual aviation personage in another way. While business leaders who save thousands of (*Continued on page 52*)



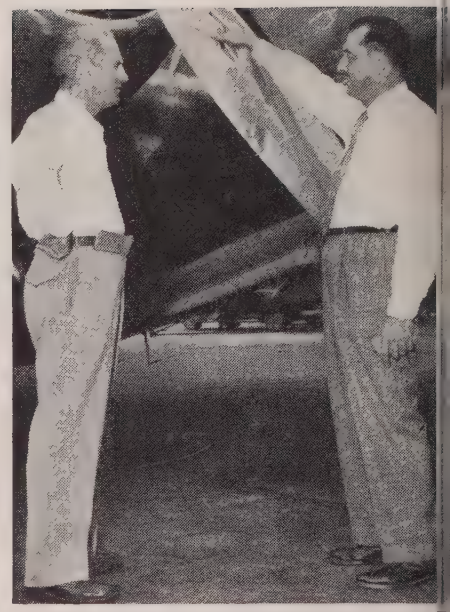
TRIPS to Port Authority facilities are quick and easy for Mr. Lowe, shown here *(above)* at N. Y. International Airport (Idlewild). Lowe learned to fly back in 1946



MAP of Port of N. Y. Authority facilities shows points which can be surveyed in minutes via 'copter. Helicopter operates from roof of Port Authority Building in N. Y.



QUAKER RUBBER COMPANY'S PV-1 sits on apron at Spartan, ready for flight to home base



PILOT Wagner and co-pilot Aliff check PV-

SKYWAYS for BUSINESS

News notes for pilots and owners of the 8,000-plus airplanes for business

Quaker Rubber Company Flying a Converted PV-1

There's a newly converted PV-1 flying the executive skyways these days and it's bound to attract a lot of attention at every airport. Owned by Quaker Rubber Company, the PV-1 recently came out of the conversion shop at Spartan Aero Repair, Tulsa, Oklahoma.

Unique feature of the Quaker PV-1 is its four picture windows, two on each side of the fuselage just forward of the door, offering executive passengers a better flight view from the PV-1 than from any other airplane. Cabin interior of the ship features maroon tufted sidewalls with a blue-gray headliner. Chairs and couch are finished in beige to harmonize with the PV-1's brown carpeting. Cabinets and wood appointments are all mahogany.

Seating for eight is provided by four fully reclining chairs, a large roomy couch, and an auxiliary seat. The four chairs are located by the picture windows, and the two forward chairs swivel to permit use of folding tables between each pair of picture windows.

The plane is equipped with an interphone system and a set of instruments mounted on the forward bulkhead so that interested passengers can read the plane's altitude, airspeed, heading, temperature and time.

The pilot and co-pilot's front office has everything for safe all-weather flight. There are two sets of instruments on the panel: one electrical set and one vacuum set to insure accurate indications. The radio installation features a 280-channel Collins VHF omni-directional receiver, two low-frequency ADF sets, and an 8-channel VHF transmitter and receiver for voice communications. Radio reception for the cabin of the executive PV-1 is provided by a Cadillac "Select-O-Matic" radio which feeds three individually regulated cabin speakers.

Quaker's chief pilot, Al Wagner, stayed with the ship throughout most of its conversion at Spartan Aero Repair. Al did all the flight checks and accepted the airplane for flight to its home base.

Orchestra Leader Flies to Keep Band Engagements

Orchestra leaders, like salesmen, are noted travelers. Also like salesmen, many leaders in the musical world are finding out the value of the airplane in their business. Ralph Flanagan, well-known band leader and RCA

V-1 features unique galley arrangement

ictor recording star, is one who began fly-
g for fun and then quickly realized it had
conomic value, too. Early in 1951 Mr. Flana-
an bought himself a Swift 125 and with it
as covered some 20,000 miles keeping or-
iestra dates. Some of Mr. Flanagan's hops
e short, covering only 50 miles or so;
hers have been trips of 300 or 500 miles.

As Mr. Flanagan puts it, "I can't begin to
lculate the hours I've saved, since my
erage quitting time is two o'clock in the
orning. At that hour it is practically impos-
ble to get travel accommodations except by
arter bus . . . and traveling by bus takes
ne. By using my plane I can get a good
ght's sleep at a local hotel, and then leave
r the next one-nighter the following morn-
g, thanks to my airplane."

This "saved time" gives Mr. Flanagan an
pportunity to write new arrangements, visit
rious disc jockeys and arrange other band
atters that add up to better business for
mself and the other boys in the band. Mr.
lanagan's Swift is paying off in added
ofits and popularity.

roducts for Exec Ships

Corporate plane maintenance men, faced
ith the problem of keeping the plane in a
gh state of polish, will be interested in a
evelopment offered by Ryan Aeronautical
o., San Diego, Calif. A non-abrasive polish
at gives a glistening, uniform sheen to
uminum surfaces on aircraft without reduc-
g the thickness of the metal was developed
one of Ryan's chemical research engi-
ers. Called "Raco 220," this polish removes
ri-colored stains and other blemishes that
ar aluminum skins. Strictly a surface
eatment, it will not remove mars caused
corrosion. Removing corrosion requires
abrasive agent. For information regarding
is polish, write Ryan.

A new paint for aircraft aluminum surfaces
s been introduced by Chamberlain Avia-
on, Inc., of Akron, Ohio. Called "Alux,"
is paint will adhere to aluminum without
iming, and only minimum surface pre-treat-
ent is required. It resists salt spray, oils,
els and hydraulic fluids.

. . . in the Corporate Hangar

Fairbanks-Morse Company's PV-1 boasts a newly designed and built interior. The plane has been in the AiResearch shop at Los Angeles for an 8,000-hour check, engine change and installation of new radio equipment and extra fuel tanks. The interior work was done at the same time. Fairbanks-Morse pilot is Jack Jones, and home base is Chicago.

Harrison Truck, affable pilot of the Odessa Natural Gas Company's Lockheed *Lodestar*, flew the ship to Spartan Aero Repair for fuel tank resealing and upholstery work on the plane's interior. The *Lodestar's* cabin, lavatory and cockpit were re-done.

National Airmotive Fibres' DC-3 features a new edge-lighted glareshield radio panel. The work was done by Qualitron at Grand Central Airport, Glendale, California.

Dick Whitney, pilot of William H. Ball's Twin Beech, has been a hangar habitué at Roscoe Turner Aeronautical Corp. Dick has been overseeing installation of additional ARC radio equipment in the D-18-S.

National Dairy Product's DC-3 has a new coat, paint job that is, put on by AiResearch. NDP's pilot, Rip Strong, and co-pilot, Pete Hilderbrand, flew the plane to the Coast for the re-doing.

Magnolia Petroleum Corporation's Beechcraft and Cessna 195 have just had their 1,000-hour check at Spartan Aero Repair. The Beech had its "front office" refinished and was relicensed, while the Cessna 195 had a bit of interior refinishing. Both ships are back in service now.

Phillips Petroleum Company has added a B-26 to its fleet of seven executive aircraft. Conversion work was done by Spartan. Plane seats five passengers, and a large "bubble" window was installed on the right side of the cabin. Phillips' aviation director, Billy Parker, made the test flights and took delivery of the airplane.

A note from a reader in Scotland reports a new trend in executive-plane advertising in England. One ad read: "For sale, 21-seat DC-3 in good condition. Price £1,000 (about $3,000) per seat. Also, two 15-seat *Lodestars* at about £900 ($2,700) per seat."

Max Pretorious, pilot for the Diehl Machine Company's *Bonanza*, has had the plane at Roscoe Turner's for an engine change.

Bill Nichols brought Cluett-Peabody's Twin Beech into Spartan Aero Repair for reupholstery work. Pilot and co-pilot's seats were re-done in plastic straw, two new card tables were installed in the cabin and four new cabin chairs were built.

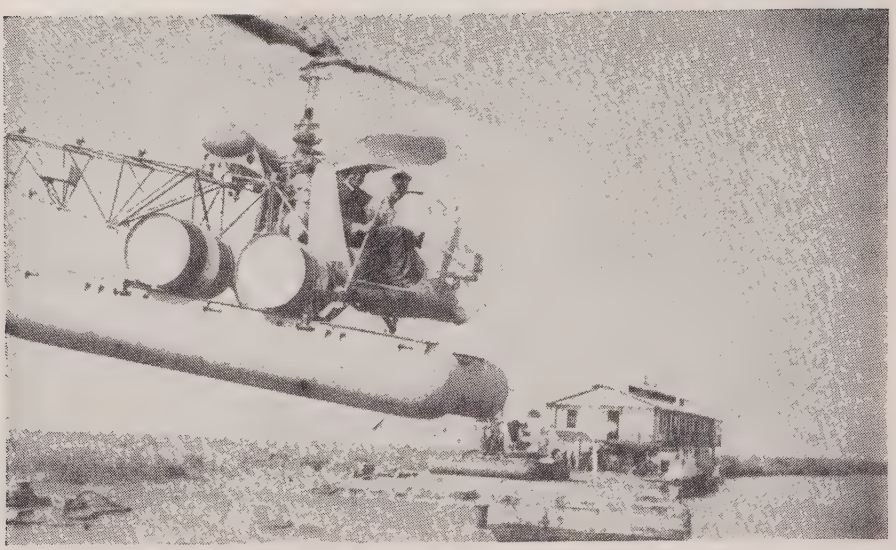
Standard Oil Company of Ohio had its Twin Beech damaged quite extensively by a storm. The plane has been in Spartan's shop for repair.

Feldman Oil Company's B-23 has been at AiResearch for installation of a long-range fuel system (wing tanks) and a fuel dump system. Overseeing the work was Chuck Sisto, Feldman's pilot, and Dale Wilson, co-pilot of the B-23.

W. J. Holliday, Sr., has had a Narco Omnigator and a Lear Autopilot installed in his busy business *Bonanza*. Installation work was done at the Roscoe Turner Aeronautical Corporation's hangar in Indianapolis.

Arnolt Corporation, Warsaw, Indiana, also has had a Lear Autopilot installed in its C-35 *Bonanza*.

Tommy Neyland, pilot for Albert Trostel & Sons Company B-25, is one of the commutin'-est pilots in the country. While the B-25 has been in the process of overhaul at Southwest Airmotive in Dallas, Tommy has been spending his work-weeks at Dallas overseeing the overhaul, and then flying home to Milwaukee in the Trostel *Bonanza* for weekends.



DOODLEBUGGER *(above)*, flown in by 'cop ter, plants a geophone to pick up soun waves in oil prospecting. Helicopter also i used to fly in supplies *(left)* and crewme

Oil-Field 'Copter

By BILL M. TINDER

Today, Helix Pleron, Greek for "spiral wing," is synonymous with a faster, easier, and cheaper method of prospecting for oil in the marshlands of Louisiana. Doodlebuggers, as the men who prospect for oil are called, were reluctant to take to the air at first, but they are now the helicopter's most enthusiastic boosters.

Briefly, oil prospecting consists of exploding a charge of TNT below the surface of the ground and recording the resulting sound waves on a wide paper tape. These waves are picked up by geophones planted several feet down and connected on the surface to a long cable. Geophones, in turn, transfer the waves to a set of electronic instruments where the recording is made.

Setting off the charge and making the recording only takes about five minutes. However, 'setting up' the process, *i.e.* moving the electronic instruments, TNT, laying the cable, and planting the geophones, will take from two hours in good marsh to six hours in bad marsh.

Using the helicopter, the whole operation can be completed in less than an hour. The equipment is placed in square wooden tubs and secured in place under the engine of the helicopter by means of four hooks which are attached to eyelets on the struts. The cables, which are from 1200 to 1600 feet long, are hooked to the side of the ship and towed sideways to the new position. Then the geophone planter is flown to each of the connections along the cable, usually about 250 feet apart, where the geophone is planted from the float of the helicopter. If a telephone line is necessary for communication between the shooting crew and the recorder, it is strung out by either towing or using a reel on the 'copter.

An airborne operation of this type usually requires two or three ships. While one is working the recorders, another is flying the drilling crew, equipment, and 10-foot lengths of metal drill pipe to each shot point along the line. The drillers dig holes about 100 feet deep for the TNT charge.

Surveying the recording lines is accomplished by towing a steel chain the same length as the recording cable and marking off the shot points at each end. Direction is controlled by a transit operator at first and then by using shot point marker flags on cane poles as a guide. The helicopter hovers and the pilot lines up the flagman correctly with the other flags by using hand signals.

The pilots, mechanics, and doodlebuggers are quartered and fed on a houseboat that is anchored in a bayou or lake close to the prospect. A flat barge, slightly wider than the length of the helicopter floats and long enough to accommodate two helicopters with the main rotors turning is used as a floating Heliport for pick-up of personnel, equipment, for maintenance, and overnight parking. Another smaller barge carrying two 500-gallon gasoline tanks is used for refueling. This barge is tied up several hundred feet away from the houseboat.

Bell Aircraft Corporation of Buffalo, New York, experimented with this type of operation four years ago, in a successful effort to develop other uses and markets for the helicopter.

Cost of maintenance in this 'copter operation averages $50 per hour, and over-all operational costs average $80 an hour. The latter figure includes capital placed in reserves, insurance, salaries, fixed operating costs, and office equipment and rolling stock. It has been estimated that financial savings of at least 50 per cent have resulted from using the helicopter rather than ground operations.

Petroleum Bell-Helicopter Services, Inc., of Lafayette, Louisiana, operating seven Model 47D1 three-place, 200-hp helicopters, is now the only helicopter service in the world engaged primarily in oil exploration. It is an outstanding example of profitable helicopter operations.

The helicopter has made possible increased production with less time consumed and has reduced the size of the crews needed for exploratory oil work.

CREWMEN watch mud and water erupt as a shot is detonated in exploration for oil operation.

CAOA REPORT . .

CORPORATION AIRCRAFT OWNERS ASSOCIATION, INC.

Corporation Aircraft Owners Association is a non-profit organization designed to promote the aviation interests of the member firms, to protect those interests from discriminating legislation by Federal, State or Municipal agencies, to enable corporation aircraft owners to be represented as a united front in all matters where organized action is necessary to bring about improvements in aircraft equipment and service, and to further the cause of safety and economy of operation. The CAOA headquarters are located at 1025 Connecticut Avenue, Washington 6, D. C.

New Members

During August eight new applications for membership in the CAOA were accepted by the Directors, bringing the total to 160. This represents an increase of exactly 33⅓ per cent since the Association moved its headquarters to Washington on March 1st. The membership total was then 120. Here are the new companies:

Olin Industries, Inc. of East Alton, Ill., manufactures arms and ammunition, and operates a Douglas DC-3 and Beechcraft D-18-S, based at Remmert-Werner, Inc., Lambert-St. Louis Airport. A second DC-3 is operated by the Winchester Arms Div., New Haven. Fred W. Heaton is the chief pilot.

Thatcher Glass Mfg. Co. of Elmira, New York, has been operating a Lockheed *Lodestar* since last spring, mainly throughout the eastern states. This producer of glass containers, with factories in Elmira and Olean (N.Y.) and Streator, Ill., formerly operated a Twin Beech. F. B. Pollock is company president, and J. Sheldon Lewis, chief pilot.

The Minneapolis Star & Tribune is an enterprising newspaper which has been operating airplanes for over 20 years. Their present plane is a newly delivered DC-3. Harold E. Perkins, Vice Pres. & Secretary of the company, is in charge of scheduling the airplane. Chief pilot is Norman L. Mitchell, former chief pilot for CAOA member S. J. Groves & Sons Co. and consulting member of the Minnesota Civil Air Defense Board.

Evening News Publishing Co., Dayton, Ohio, has operated aircraft since 1940 and currently flies a Lockheed *Lodestar*. "The News League" includes two dailies in Dayton and two in Springfield, Ohio; two in Atlanta, Ga., and one in Miami. Three of these (including Dayton) are known as *The Daily News*. James M. Cox, Jr., is president of the company, and Ralph W. Smith is chief pilot.

The Savin Construction Corp. of East Hartford, Conn., operates a Beechcraft D-18-S, based at Rentschler Field. A. I. Savin is president of the company, and A. A. Yanaskas (ATR) is the corporation pilot.

Eaton Manufacturing Company, automotive and aviation parts manufacturer of Cleveland operates a Twin Beech based at Lost Nation Airport, Willoughby, Ohio. H. W. McGinn is company president, and William E. Jeavons is the pilot.

Consolidated Vultee Aircraft Corporation of San Diego, Calif., has re-joined the Association. Convair had been a member in the early days, dropped out for a couple of years, and now is back in again, largely on account of CAOA's increased activities and growth since transferring its office to Washington. The corporation operates two *Convair 240's*, a Lockheed *Lodestar* and Stinson 150 *Voyager*, all based at Lindbergh Field, San Diego. Gilbert D. Clark, Regional Sales Manager, was appointed as CAOA representative. Convair, as an active unit in the aviation industry, is an Associate Member.

CAOA Goes Far Afield

Join CAOA and see the world. Many of the Association's member companies have been making increasing use of their aircraft in trips to Canada, Alaska, the Caribbean, and to Central and South America. These companies include Monsanto Chemical, Morrison-Knudsen, Fairbanks, Morse & Co., the Crane Company, the M. A. Hanna Co., Republic Steel, Dresser Industries, etc.

One of the most widely traveled aircraft in the CAOA fleet is the Fairbanks-Morse B-23, acquired from Pan American during the summer of 1949. The Douglas B-23 was a limited-production bomber, and while it never saw actual bombardent service, its long range and relatively high speed made it natural for conversion to de luxe executive aircraft. About 15 B-23's are now flying, including those operated by General Electric, International Harvester, Tennessee Gas Transmission, Food Machinery & Chemical, Feldman Oil, National Distillers Corp., etc.

According to Chief Pilot Jack Jones the Fairbanks-Morse B-23 is flown between 600 and 700 hours per year and has visited every country in Central and South America and most of the Caribbean area. Nearly all of these countries' flags have been reproduced in color above and below the two windows aft of the passengers' entrance (*see photo*). The CAOA emblem has also been pasted on the inside of one window. Fairbanks, Morse & Co. is taking delivery of a Lockheed PV-1 *Ventura Executive* from AiResearch Aviation Service, Los Angeles, during November, William C. Wold Associates, New York, is handling the sale of the B-23.

Had Any Omni Failures?

In cooperation with the RTCA SC60 (VOR Test Signals) CAOA's Technical Committee has sent out questionnaires to more than 500 member and non-member corporation pilots for details regarding instances of VOR (omnirange) receiver malfunctioning which resulted in false information to the pilot, and where the information *appeared* to be correct (*i.e.*, no flag alarm, etc.).

Similar information is being gathered by ARinc from the airlines, by the committee chairman Jim Riddle (NARCO president) from private pilots and by representatives of the Air Force and Navy.

A report on SC60 progress will appear in the NAVICOM section within a month or two.

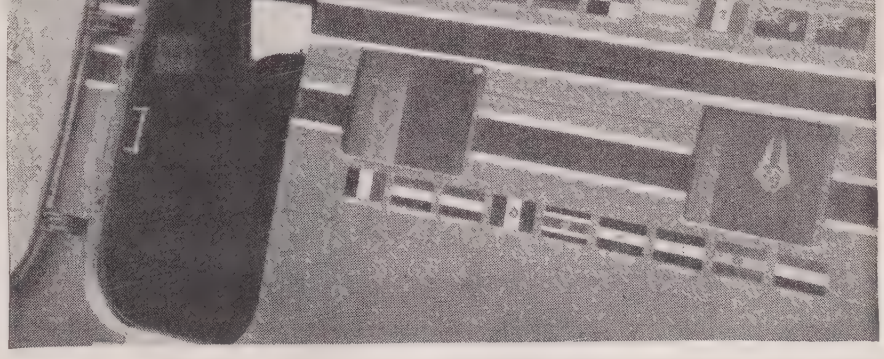
New Directory

The 1951 fall edition of the CAOA *Directory of Executive Aircraft* is off the press and the CAA expects that the usefulness of the previous issues will be greatly exceeded by the new directory. The Air Route Traffic Control people, in particular, believe that as the accelerated ATC procedures are implemented throughout the country, the CAOA Directory will fulfill a highly important function.

Copies are being sent to all state aviation officials through NASAO, to all managers of terminal airports through AOC, and to key members of the AAAE (smaller airports). The joint CAA-Air Force civil aircraft identification teams will also be supplied with copies.

If member companies wish to have additional copies (enough were mailed out to provide one copy for the office and one for each aircraft operated), simply write to CAOA office, 1025 Connecticut Avenue, Washington 6, D. C.

FAIRBANKS-MORSE executive B-23 has visited every country in Central and South America and most of the Caribbean area. Flags of these countries have been reproduced on B-23



TC is Ready

(*Continued from page 29*)

During the recent Kansas flood, five of the 18th AF wings proved Troop Carrier's ability to hustle when the chips are down as well as in training maneuvers.

Three hours after a call was received for aircraft for emergency aid in the flooded area, planes were in the air headed for this scene of disaster.

Troop Carrier delivered and dropped tons of food, clothing, medical supplies, rescue boats—even 50,000 sand bags to bolster sagging levees—into the flood zone, flying as many as 11 hours a day.

"Exercise Southern Pine" in July and August was the latest combat condition field maneuver in which Troop Carrier delivered the goods in joint air-ground forces operations.

Drops of 6,000 paratroopers in two days, along with arms and equipment to wage a winning battle, including field pieces such as 5,000-pound 105-mm cannon were accomplished.

The 314th Troop Carrier Wing of Stewart Air Force Base, Smyrna, Tennessee, only regular wing in the 18th Air Force, pioneered use of the new Chase YC-122 assault aircraft and Bell YH-12 helicopter in this Carolina training maneuver.

Commanded by Col. Hoyt Prindle, a veteran of Troop Carrier action in Korea, the 314th helped employ techniques learned under fire in the Korean conflict.

A highlight of "Southern Pine" was use for the first time of the twin-engine C-122 type airplane for assault landing of equipment and troops.

Landing on a rough strip hacked out of a scrub oak thicket, five 122's delivered and unloaded five 105 mm cannons and five jeeps and were airborne again from the downwind end of the strip in 11 minutes.

Fairchild C-119's and C-82's are being used for delivery and air-dropping of heavy equipment and arms, and the older C-46 *Commandos* are still in service as carriers for airborne troops.

The *Packet* is proving a real all-round airplane, expediting drops of the heaviest equipment ready for use. The C-119 made one of its biggest splashes when it dropped sections of an entire 250-ton bridge in Korea. Since then it has chuted down a 25-ton bulldozer in training exercises.

Troop Carrier planning now is focused on a near future date when it can employ the new giant of carrier aircraft, the Douglas C-124.

This four-engine *Globemaster* is designed to deliver a payload of 50,000 pounds in a range of 2,300 miles or haul 200 fully equipped troops.

Creation of the 18th Air Force June 1 elevated Troop Carrier to air force level for the first time and united one of the largest groups of reserve personnel returned to active service in the Air Force build-up.

Performance of these "civilian" groups has won plaudits throughout the Air Force and wing walls are lined with commendations for outstanding participation in joint air-ground force training operations.

Under 18th Air Force command are the 375th and 443rd Wings at Donaldson AFB, Greenville, South Carolina; 516th Wing at Memphis, Tennessee; 514th Wing at Mitchel Field, New York; 314th Wing at Smyrna, Tennessee; 435th Wing, at Miami, Florida; 403rd Wing, Portland, Oregon; 434th Wing, Columbus, Indiana and, until its overseas shipment, the 433rd Wing at Greenville, South Carolina.

The wings and 18th headquarters are loaded with veterans of Troop Carrier operations in all theaters of operations in World War II and more recently in Korea.

Colonel John W. Oberdorf, 18th Deputy Chief of Staff for Operations, had a hand in either flying or planning most of the major airborne missions in Europe during World II, including the invasion of Sicily, Normandy and crossing of the Rhine into Germany.

Eighteenth Air Force has brigadier generals in command of three of its wings now on active duty from reserve status: Lacy V. Murrow, 434th Wing; Chester E. McCarty, 403rd Wing, and Arthur L. McCullough, 514th Wing.

General Murrow, former vice president of the American Association of Railroads in civilian life, got his commission in the Air Corps in 1926 and was called to active service for World War II in 1940. During the war, he flew in all theaters of action.

General McCarty first joined the military in 1920 as a private in the Oregon National Guard. He joined the Air Force as a captain in 1942. Gen. McCarty is a member of the important Department of Air Force Committee on Reserve Policy and is past president of the Air Reserve Association.

General McCullough graduated from West Point in 1920 and became an air reserve officer in 1929, returning to active service in 1942. In civilian life he was a captain, Trans-Atlantic routes, Pan-American Airways.

Packed with experience wartime flying personnel and utilizing the latest types of equipment and techniques, Troop Carrier is growing up.

With battle-condition air-ground exercises scattered from the pines of Carolina to Alaska, scene of "Operation Firestep" last spring, under their belts, the new Troop Carrier outfit and their ground forces teammates figure to be well ready to waylay an enemy when and where he's not looking.

Rangers on the Wing

The State of New York's Forest Rangers call the Grumman *Goose* "one of their most valued pieces of equipment." The Rangers use the airplane for many jobs in addition to its regular work of forest-fire fighting. The seats of the *Goose* can be removed in six minutes to convert it from a passenger aircraft to a cargo hauler. Two external bomb racks, located just outboard of the engine nacelles, are used to carry large bundles of fire-fighting tools to the scene of operations and then dropped to the Rangers below. Under development at the present time is a method of laying fire hose by air. Charged with protection of 22 million acres of forest land, the Rangers also use the *Goose* to plant trout streams, etc.

Pilot Report . . .

(*Continued from page 14*)

urn-and-bank by itself.

An interesting safety device for the "oc-asional pilot" is the circuit breaker of the orward cargo door. If the door is not locked, he right starter will not operate.

Engines are started on the left magneto vhere an impulse is installed. Just as the rop starts turning the fuel boost pump goes n to prevent flooding the carburetor. After he engine begins to fire, the manual mixture ontrol goes to full rich and the other mag s snapped on after the engine starts.

Actually, there is nothing to starting, taxi, re-flight and in-the-air operation of the *Twin Bonanza* that is different from its single-en-ined ancestor.

Even while sitting in the middle of the ront seat where the cowling is at its highest, isibility is excellent for taxiing. The nose vheel is steerable and controlled by the rud-ler pedals. By applying inside brake and utside throttle, sharp turns can be made lown to a three-foot radius. These single-lisk Goodyear brakes are the only hydraulic-lly operated equipment on the airplane.

If you've never before flown a twin-engined irplane, you can set the throttles and taxi he Model 50 just like a single-engined air-raft. However, it is the most natural thing n the world to "push" one side of the air-lane around a turn on the ground with hrottle and stop the turn with a little "in-ide" throttle.

Engine run-up is always made into the vind to help keep the head temperatures lown. The only pre-flight item not found on he average single-engined plane is the full-eathering propeller. A check of this unit hould be made with the engine in idle rpm. The Model 50 prop installation is clever—omething that designers of larger transport-ype aircraft might well copy. There's no iso-ated feather-button for the pilot to find and ush when he should be very busy doing omething else. On the Model 50, you merely ull back on the adjustable-pitch propeller ontrol—for full high pitch—until the con-rol rests on the stop. A slight additional ressure by-passes the control stop and the andle comes farther back, cutting in the lectric feathering motor. The action is fast nd in four seconds that blade will be topped.

Warren Filer made the first demonstration ake-off. Acceleration was rapid as the pilot sed full power and 10° of flap for a quick ake-off. The ship will fly off with a little ncouragement at 65 mph, but normal take-ff speed is 75. Safe single-engine speed is 85 mph, so the normal procedure is to get the hip into the air, relax very slightly on the ack pressure until the needle passes 85 mph, nd then hit the gear-up switch (identical vith the *Bonanza* switch) and begin to limb. The gear takes 8 seconds to retract illy and the flaps can be "dumped" as soon s any obstacles are cleared.

Both the rate and angle of climb are ex-reme. The best rate of climb is at an ndicated 110 mph with 3,000 rpm and full hrottle. This will produce 1500 feet-per-inute at sea level with a full load. The best ngle of climb to clear an obstacle is at 78 mph. Since there were only four of us board on this first hop and the fuel tanks ere half empty, the rate of climb steadied out at just over 1700 fpm. However, if you owned one of these trim little planes, you would undoubtedly use "cruising climb" of 80 per cent power at 2800 rpm and an indicated speed of 150 mph.

By the time the instruments were rechecked and we had pulled out of the traffic pattern, we were already at the 5,000-foot cloud base. The air was gusty and sultry, but there was no tendency for the *Twin Bonanza* to wallow around.

The factory pilot gave the usual slow flight, stall and single-engine demonstrations. There was no attempt to show extreme positions or over-do the manufacturer's specifications as is done too frequently by flying salesmen. Mr. Filer's demonstration was safe-and-sane, yet it showed the airplane to good advantage.

As in all other Beech aircraft, a stall warning indicator is standard equipment. While some experienced pilots may scoff, the gadget has an excellent record and the beep of the horn is a definite reminder that your aircraft is just about all through flying.

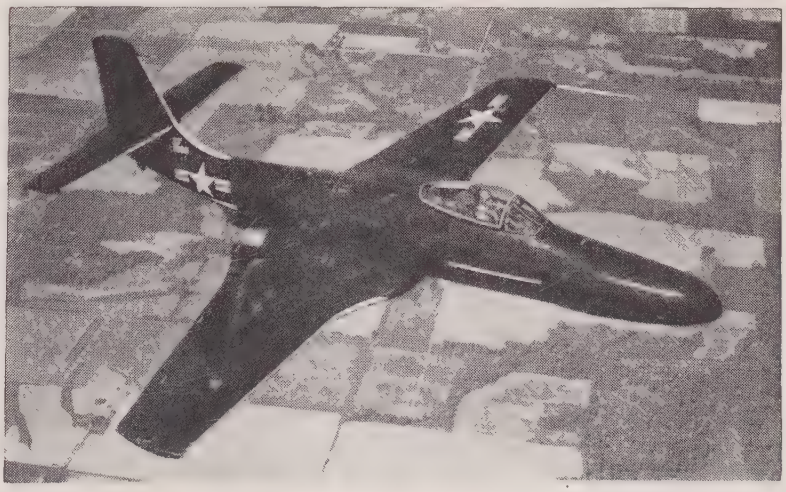
Gear and flap-up stalls occur at 75 mph and drop to 64 mph indicated with the gear and flaps down. The flaps come down 30° and they increase the wing lift almost one third at full deflection.

Mr. Filer showed how the aircraft, with the wheel held all the way back and the pilot's feet off the rudders, will fall straight through in a mild oscillation without dropping a wing. Then he demonstrated how the

(*Continued on page 45*)

Picture-Taking Jet Banshee

Deliveries have been made to the Navy of the first carrier-based jet photographic plane ever developed. Designated F2H-2P, this version of the McDonnell *Banshee* already has completed successful photo missions ranging in altitude from 50 feet to 10 miles. A combination view finder provides the pilot with a clear, unobstructed view of the terrain below and ahead of the plane, and the pilot, utilizing cockpit controls, can rotate cameras to any position in flight.



Flying the Boom

(*Continued from page 22*)

an eagle's eye view of the whole operation. By glancing slightly up from his normal line of vision, the receiver pilot of the B-47, for instance, can look along the boom to the tanker some 25 feet away. "Clancy"—the boom operator—has just the opposite viewpoint, looking down the boom at the receiver's receptacle and into the control cabin of that airplane.

From this moment until the termination of the refueling operation, the relationship between the boom operator and receiver pilot is comparable to that of a GCA controller and a pilot on instrument approach. Although visual reference to the boom and tanker can be a help to the tanker pilot, he must rely on the judgment and decisions of the boom operator to guide him and his airplane into the most favorable position for contact.

When the receiver has moved into position with slipway doors open, the boom is slipped into the receiver's receptacle and locked there automatically.

Once this contact has been made, the gas transfer is controlled by the tanker engineer who selects the tanks from which the fuel will be drawn and regulates the rate of flow to the receiver's capabilities. By pre-arrangement, valve adjustment and transfer pumps can be set up to begin fuel flow the instant contact is made, or the transfer can be initiated any time after contact has been established.

During the refueling operation, it is desirable that a contant altitude be maintained and that airspeed be allowed to increase as the tanker's gross weight decreases. However, refueling contacts have been made, and fuel transferred in climbs and dives and in banks to both right and left.

When the receiver airplane's fuel capacity has been reached, the tanker pilot pulls up and away from the receiver to complete the operation.

In the event that rough air should cause the two airplanes to separate beyond set limits during refueling or cause the receiver to overrun the tanker, normal procedure in this case would call for the pilots to reformate and begin the refueling operations all over again.

This system has certain advantages over earlier refueling methods. Foremost, it is faster—although figures on fuel flow are restricted, it is apparent that pressure pumping through a relatively short and large-diameter metal pipeline will allow faster fuel flow than through a flexible and much longer hose.

In addition, this new method allows refueling contacts to be made at higher airspeeds and at higher altitudes than previously was possible.

The history of in-flight refueling attempts dates back, as far as is known, to 1923 when U. S. Army pilots made the first known aerial fuel transfer over Kelly Field, Texas. Later in the same year, two Frenchmen set the first refueling record when they succeeded in transferring 12 gallons of gasoline in 12 minutes.

In 1929 the art of aerial refueling took its first big step forward when Gen. (then Maj.) Carl "Tooey" Spaatz and his crew in the Army's tri-motored Fokker "Question Mark" stayed in the air for 150 hours, 40 minutes over Los Angeles. They used the trailing-hose-type system. By 1935 the Key brothers had upped this endurance record to 27 days.

Each of these "record" flights was made with crude equipment. Fuel transfer could be made only at ideal conditions of speed, altitude, temperature and weather. In most cases manual contact was made with the trailing fuel line towed by a primitive tanker and, in some cases, the refueling was accomplished simply by lowering a five-gallon gas can by rope from one airplane to another.

Just prior to the announcement of the Flying Boom, one of the world's most significant flights was made by a Boeing airplane utilizing another aerial refueling method. This airplane, the B-50 "Lucky Lady II" made the world's first non-stop 'round-the-world flight with Boeing-installed hose-type refueling equipment, a system perfected in England by Sir Alan J. Cobham's company, Flight Refueling, Ltd. (*SKYWAYS, March, 1951*)

The "Lucky Lady II" made four refueling contacts during its 23,452-mile flight which began February 26, 1949 and ended 96 hours later. Its average speed from take-off to landing was 249 mph including the time required for the refueling operations.

Today, with Flying-Boom equipment installed as standard operational gear on certain fighters and bombers (F-84B, F-86H, B-47B, B-50), less spectacular but just as important refueling missions are becoming an everyday occurrence.

The simplest of these involves refueling a bomber almost immediately after its take off for a long-range heavy-load mission. Because the airplane can fly at a higher gross weight than it can carry off an airfield, it is most profitable to devote the largest portion of its take-off weight to bomb load, then top off all tanks in the air almost immediately.

If the distance to the target is too great to be accommodated by this one refueling contact, any number of others can be made during flight.

As an adjunct to their primary missions as aerial refueling tankers, KB-29's and KC-97's can serve also as swift tank cars, delivering gasoline or other liquids to hard-to-reach advance bomber bases when ocean-tanker or overland means might be impractical or too slow. In this connection, the slow and painful aerial hauling over the hump to supply the first China-based B-29's is worth mention. Especially suited to this job is the new KC-97 because of its ready convertibility as a troop, heavy equipment or hospital airplane. Once landed and gasoline discharged, its refueling gear can be removed quickly and replaced with the necessary facilities to evacuate up to 79 litter patients, their medical attendants and supplies.

In a recent time test a KC-97 was transferred from a 134-passenger troop transport to a refueling tanker in six hours, 10 minutes. Although the conversion was made at the Boeing Seattle plant, conditions of the change were made similar to those which normally would be encountered at any USAF bomber base.

Shortly after the "Lucky Lady II" returned from its globe-girdling flight, Lt. Gen. Curtis E. LeMay, Commanding General of the Strategic Air Command, said, "The only limit to refueling is the number of tankers and bombers that we can congregate safely in one locality at a given time."

He was speaking, of course, of the hose-type refueling method. Today, with Flying-Boom equipment being manufactured and installed in both fighters and bombers on a regular production schedule, this limit is shrinking fast.

SHATTERED PROP, believed to be one of those from the dirigible *Macon* which crashed off California coast in 1935, was found on beach by Ray Goudy *(right)* a civilian pilot. Inspecting the piece of prop with Mr. Goudy are *(left)* Lt. Robt. Davis, USN (ret.), a *Macon* survivor, and Lt. Robt. Hennessey *(center)*

Scramble Six!

(*Continued from page 17*)

"Hello, skidoo, red leader here. Steady on wo three zero. Passing through angels ifteen. . . ."

For the thousandth time since January, one f the Alaskan Air Command's fighter-nterceptor groups had scrambled.

Time is all-important as the radar-guided nterceptors converge on an intruder. Loaded guns back up the standing order to positively dentify the aircraft as friendly or shoot it down.

Sometimes it's a bush pilot with a jammed adio, sometimes it's an airliner ahead of schedule, but before the fighter pilot eases back in his tiny cockpit and heads homeward, he's made sure the "blip" on the radar screen is not an invader.

Twenty-four hours a day, Alaska's fighter teams keep their watch. The tension of long confinement in their ready shacks is broken by ball games, chess, and meals which are brought in from the mess hall.

Daylight is no indication of time, when summer in the Arctic brings but one hour of darkness and winter a few hours of daylight.

"You never really know when to go to bed," said one pilot waiting out a 24-hour shift.

Speed and proficiency of ground operations are the secret to keeping Alaska's jets ever-ready for the swift take-off to intercept an attacker. Effective operation for jets requires that they land, refuel, and take off again in a matter of minutes, and crews have between-fight maintenance precision-timed to insure that speed and efficiency.

"A jet's no good on the ground," commented Staff Sergeant Ernie Arriola of Los Angeles, a crew chief, as he left to meet his arriving aircraft.

"Planes are as individual as cars," said Captain Bud Rose, one of Alaska's top fighter pilots, "and the mechanic is as important as the driver."

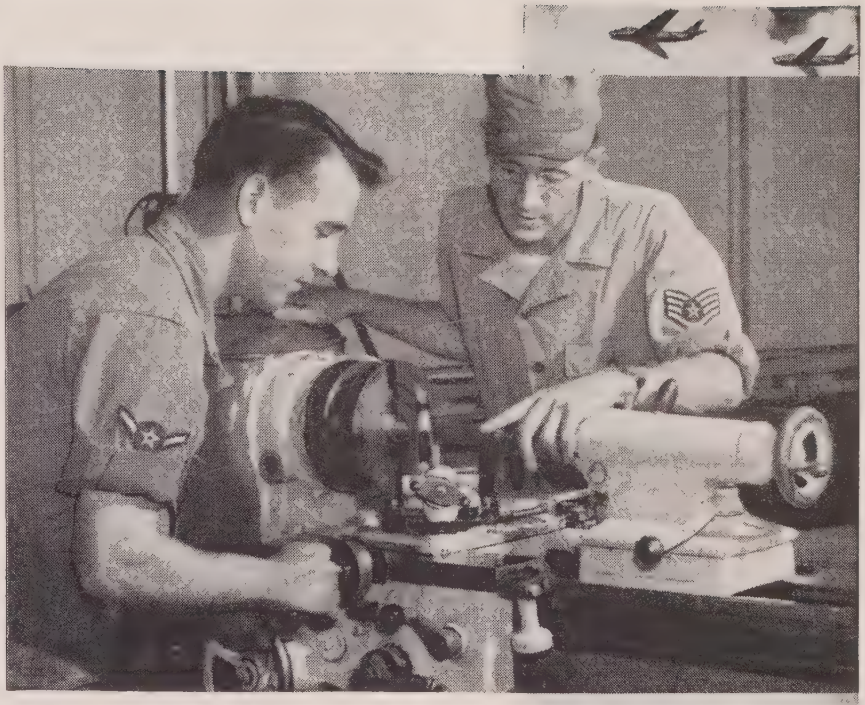
The other two specialists of an Alaskan fighter team are the "ammo" (ammunition) man and the radio maintenance man. They each are responsible for several aircraft. The best word of praise any of these men ask is the pilot's "good ship!" when he comes in from a mission.

Today's fighter pilots still retain a touch of that independent spirit that has always typified the man who flies his plane alone. Now it takes the form of a pilot adjusting his own survival equipment before a flight to include what he feels is important. Maybe he'll toss out a pair of heavy socks to add another flare or a chocolate bar.

"Arctic survival training helps a man feel he has a good chance for rescue," said Colonel John Mitchell, a group commander, "but the proficiency of the whole fighter team is the safety margin we rely on."

The spirit of teamwork is strong in Alaska's fighter groups, as once the jets leave their home base in Alaska the rugged mountains and glaciers offer no landing spots, and the radio is still the one and only ticket back home.

As one pilot put it, "When you're at 12,000 feet and still taking ice, you're sure glad the guys that crewed your airplane knew what they were doing!"



Accent on Opportunity

Until recently Private First Class Myron Jarman of Beverly Hills, California, was a student at Santa Monica City College and U.C.L.A. One day he read of the 45 career fields in the U. S. Air Force training program, and recognized his chance to combine his interests and aptitudes in creating a responsible job for himself.

Soon after enlisting he became a student machinist. In the photo, he is "blanking out a lathe model." Under his instructor, Staff Sergeant Albert D. Clark of Loveland, Colorado, Airman Jarman will learn mechanical drawing, blue print reading, use of small hand tools, lathes, milling machines, contour machines, shapers, heat treating and grinding.

After 21 weeks of school, Myron will be an apprentice machinist. As he advances in experience and ability, his rank and pay will increase. He can find a vital and interesting career in the U. S. Air Force.

You, too, can have this opportunity! You can earn while you learn, in the field where you qualify. Find *your* place in one of the more than six hundred job specialties in the Airman Career Program. For details visit your nearest U. S. Army and U. S. Air Force Recruiting Station.

RECRUITING U.S. ARMY U.S. AIR FORCE

U. S. AIR FORCE

Pioneer by Plane

(*Continued from page 33*)

park since it opened in April, 1948, and has built a reputation for efficient and economical mechanical work. He performs all the A & E work on the Airpark's 10 trainer and charter aircraft, and services most of the more than 35 private planes using hangar or tie-down space there. At present Edwards has four men working for him, and is logged up for a month ahead. In the past six months he has overhauled four 195's, three Beechcrafts and a *Navion*.

McDonald's *Bonanza* is checked every 100 hours. Last January, Edwards did a complete overhaul on the engine. "We tested it . . . and the next day 'Mac' took off and flew to Florida," Edwards explained, pointing up McDonald's faith in the work.

That Florida trip included a swing through Texas, Mississippi, Georgia, the Carolinas and Virginia for meetings with I. E. L. representatives. On a wall beside McDonald's desk in the Seattle office at 1112 Westlake Ave. N., a large map of the United States is speckled with pins representing subsidiary dealers—about 300 in all. He flies most of the dealers who come out to visit him in Seattle to the factory at Vancouver. "I haven't driven up there in three years," he explains, enjoyment of the fact in his voice.

H. D. McDonald is well known, if only by radio conversations, all along his customary route to Canada. An incident occurring last winter points up this fact. He was enroute to Vancouver and ran into some weather on the way. The ceiling kept getting lower and by the time he reached Boundary Bay he had been forced down to 75 feet above the water. Calling the Vancouver Airport, he was told there was a 200-foot ceiling with visibility limited to half a mile. In the face of that report, McDonald landed at a restricted airport on Boundary Bay, where he was immediately recognized and welcomed by Canadian Army officials. That was the only time he ever had to land short of his destination. Later that day, however, he did get through.

For the most part, such an inconvenience is far outweighed by the safety and speed of flying. As McDonald puts it: "The only place I feel safe is in the air. It's dangerous down here on the ground driving an automobile."

There was a time in his experience when flying wasn't so safe. That was back in 1919 when he and some friends, recent graduates of Medord, Oregon's high school, were thinking up money-making ventures. They acquired a Curtiss *Jenny*, learned to fly it and barnstormed about the Pacific Northwest. They charged passengers $5 for a three-minute ride, and cow pastures were their landing strips.

McDonald has had many planes since then. His latest purchase and greatest pride is a Grumman *Goose*, bought jointly with another Seattle businessman, Howard Keeler. This twin-engine eight-passenger executive amphibian dwarfs the planes of most individuals. It even towers over the administration building of the North Seattle Airpark where it has been kept since May of this year.

Operator Edwards also does maintenance on the *Goose*. "We have installed a new float, run retraction on it, painted wheel wells and overhauled the gear assembly," reports Edwards.

Operational costs on the *Bonanza* average around $8 or $10 per hour, but on the *Goose* they are from $50 to $75 an hour.

At Edwards' shop, labor cost on a major for a *Bonanza* is around $400. However, daily maintenance is very little, he says . . . and other than oil changes little is needed. Relicensing once a year by a designee (which Edwards is) or a CAA official may necessitate small minor repairs, but these seldom amount to more than $75 or $100 on a plane like a *Bonanza*.

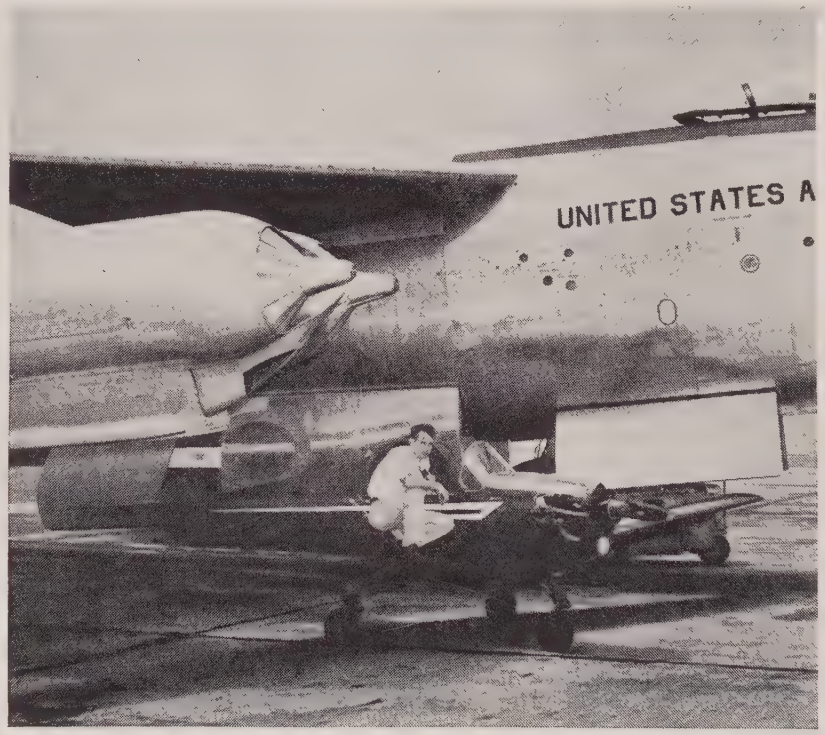
Edwards points out, however, that McDonald is especially particular that everything, from paint to engine be kept in top-notch condition. This involves additional costs, but also cuts the possibility of accidents to the zero point in McDonald's case.

Also effective in accident-prevention are the complete and up-to-date instruments in McDonald's planes. The Beechcraft has a primary group plus L/HF. The *Goose* is equipped with a full airline-type blind-flight group, and also has the standard range receivers in addition to automatic direction finder equipment.

The *Goose* is primarily a pleasure plane, used chiefly for hunting and fishing trips into Canada and Alaska, for both owners are avid sportsmen. Any sunny morning may see McDonald and his partner taking off from Seattle for Whitehorse, Alaska, about a six-hour flight in the *Goose*.

Three times this past summer McDonald has made fishing trips into the wilds of British Columbia in the *Goose*, accompanied by Mason Keeler, Howie Odell, head football coach at the University of Washington, and S. R. Newman who is in charge of sales for United Airlines, Western Division. They flew up the Inside Passage (via Malaspina Strait) to Bute Inlet, then across country to Tsuniah Lake which lies between 10,000-foot peaks and can be reached only by plane.

The Grumman *Goose* is a far cry from the original *Jenny*, but it probably isn't the last word in McDonald's aerial ventures. The Seattle "Pioneer" distributor's methods and products are both as modern as tomorrow and his success, in part, stems from the skyways.



Wichita's Big an' Little

The Air Force's giant six-jet B-47 bomber, currently in production at Boeing's Wichita plant, towers over the little single-place Mooney *Mite*, also manufactured in Wichita, Kansas. Pilot on the *Mite's* wing is Bob Faris who flew his tiny ship to a new world's distance non-stop record in very-light class. Bob flew the Mooney from the Wichita Air Force Base to Watertown, N.Y., a distance of 1,210 miles in a little over 12 hours. The *Mite* made the non-stop trip on 45 gallons of gas; cost: about $10.

Pilot Report...

(*Continued from page 41*)

wing could be picked up or dropped with aileron alone while the wheel was all the way back. The science of aircraft design has certainly improved for that maneuver was once fatal in older aircraft.

Optimum cruising speed on 75 per cent power is over 190 mph at 7,000 feet. Because of the cloud base and choppy air, we settled for 4,000 feet and a corrected airspeed of 184 on 75 per cent power. Red-line on the Model 50 is 220 mph although the designed diving speed is 243. One page of the very complete pilot's manual is devoted to turbulent air penetration speeds. For 30-foot-per-second gusts, the plane should be flown above 135 mph and under 220. For severe gusts rated at 43 feet-per-second, the airspeed should be over 160 and below 200. The consideration of gusts above the 30-foot mark is relatively new, but rough-weather pilots have found that such conditions frequently exist.

For quick let-downs, the new *Twin Bonanza* will really go downstairs. With the gear and flaps down, power off and the plane pushed over into a dive, the rate-of-climb will show a drop of 4,000 fpm while the airspeed stays below 120 mph.

Then the factory pilot shut off one engine and continued his demonstration. The feathering procedure is simple. Cut the throttle on one engine and add power to 3,000 rpm on the "good" engine to maintain altitude. Close the "bad" throttle completely, pull the prop control back to feather the engine, and shut off the ignition and generator switches after the engine has stopped. Cut the mixture control and turn off the fuel to the "bad" engine, and that's all there is to it.

The airplane will trim-out hands-off at 100 mph with one engine feathered and will actually climb over 300 feet-per-minute at sea level on one engine. The plane has full control with one prop feathered and steep turns can be made in either direction. The old bug-a-boo of the danger of turning into the "dead" engine no longer applies on this new model. The few minutes spent in cruising over Oklahoma with the left engine completely cut down was certainly a confidence builder. All at once, the *Twin Bonanza* becomes an airplane that you would take anywhere, over any terrain at almost any time.

Gear-down speed is 125 mph. When a green light shows on the panel, a mechanical needle connected to the nose wheel shows "DN" and the warning horn doesn't blow when the throttles come back below 12 inches of manifold pressure—then the gear is down and locked.

Actually, there's little to write about landing the *Twin Bonanza*. It's just easy—that's all. The ship carries 85 mph down the final approach. 75 across the fence and touches down below 70 mph. The big brakes bring it to a quick stop without any tendency to pull off to either side.

"Try taking it around from the center seat," said Mr. Filer as he flipped the thrower wheel to my side.

It does feel a little unusual to fly a twin-engined airplane from the middle of the front seat, but there is nothing to it that a pilot couldn't become accustomed to in a few hops. Later in the day, I flew from the left-hand seat and felt completely at ease. From the center, the elevator trim tab is a little difficult to reach when you want to make adjustments on the final approach. However, it is completely accessible from the left seat. Since almost all normal flying would be done from the left seat, there's no real problem involved. In a plane of this type, the dual-control feature is ideal for check-outs and relief on long flights, but the plane is so comfortable to fly that a second pilot is unnecessary.

When you climb into the driver's seat and fly this airplane, you really appreciate the complete airplane. You have everything to work with that you'll ever need. A full set of gyro instruments are standard equipment and the instrument panel is slanted upward 10° for easier vision. The control touch, both on the ground and in flight, is just "heavy" enough for comfort. Throttle and prop controls are easy to reach, and you feel as though you were sitting right on top of the world when you taxi out in this pert piece of executive transportation. It's like driving a shiny new Cadillac down Broadway.

A seemingly endless list of small items help make the Model 50 a completely finished airplane. Flashing navigation lights, a dome light that goes on when the door is open, automatic mixture control on the Bendix pressure carburetors, thermostatic bypass valves for oil-temperature control, retractable step, radio speakers built into the top and rear bulkhead, space for a radio loop in the plastic cone and a plushed blue-green cabin interior all help to make the *Twin Bonanza* a complete airplane.

Even the landing wheels protrude slightly below the fuselage when retracted to give protection in case of a gear-up forced landing.

Since this airplane is designed basically as an executive transport, I went along on another demonstration flight to find out how the "other half" lives in the back seat. There's plenty of leg room in back and the back of the right-hand front seat folds forward to give ample entry room. Both center and left front seats are adjustable, but even all the way back, they do not intrude into the wide back area.

"There's no shortage of Oklahoma 'beef' on this flight," laughed a 240-pound construction executive as six of us piled aboard. Our passenger weight was 1,190 pounds, but there was still plenty of room in the airplane, and the performance on one or both engines was almost identical with the performance with lighter loads.

As in the smaller *Bonanza*, the rear 14-cubic-foot cargo compartment is accessible in flight from a shelf behind the rear seat.

The latest twin in the Beech family is cut out to do a fast-moving job of executive transportation. Yet it still has the easy-to-fly characteristics of a lightplane that can permit any business man to double-in-brass as his own pilot if he has the ability to fly a modern single-engined airplane.

Aircraft like the *Twin Bonanza* will go a long way toward selling the American business man on the valued efficiency of corporation-owned planes. And the new owners will undoubtedly boast about the newest "Twin" in the business family.

TWA
ONLY TWA TAKES YOU ALL THE WAY
ONE-AIRLINE SERVICE
TO THE CAPITALS OF EUROPE
FROM 60 U. S. CITIES
46 transatlantic flights weekly with the world's largest Constellation fleet.
SEE YOUR TRAVEL AGENT or call
Trans World Airlines
Across the U.S. and overseas... you can depend on TWA

HELIO COURIER is a four-place version of earlier two-place Helioplane

HIGH-LIFT wing devices make slow flight safe

Helio Courier Demonstrated

The long-awaited production prototype of the four-place spinproof Helio *Courier* was demonstrated recently to Boston public officials. The executive-type *Courier* repeatedly took off and landed, with full load, from a 100-yard strip near the city's business district. In putting the airplane through its paces, the pilot slowed it down from a normal 150-mph cruising to criss-cross the area, banking steeply to show the plane's unique ability to make turns close to the ground with safety at 35 mph. Slow-flight feature of the plane is made possible through high-lift wing devices, and control system.

Two-Way Stretch

(*Continued from page 19*)

Even esthetics—eye appeal—go into the stretching of a modern airplane. "We don't want to make an airplane l k like a box car as far as the public is concerned," says Jim Hong, for 10 years a member of Lockheed's aerodynamic engineering section. "For all practical aerodynamic purposes, we could have used a perfectly straight insert section in stretching the "Super Connie," but it would have looked like the devil. As for the increased fin area, it would have been completely practical to add to the center fin only, but the finished product looks better if all three tails are the same size."

As the science of aerodynamics advances, the problem of making a *good* big airplane out of a good medium-sized airplane can be more easily forecast, but this has not always been true. The original World War I Fokker D-7 biplane had such bad spin characteristics that it never would have been built in volume if an additional bay had not been added to the fuselage at the last minute. Then the plane went on to win the design competition and was one of the best fighters in its era.

A great many of the reliable old-time airplanes were stretched versions of a basic design. The single-engined Fokker *Universal* grew easily into the famed tri-motored Fokker. The Ford tri-motor came as a logical jump from the experimental single-engined Stout airplane powered by a Liberty engine. A complete line of DeHavilland biplanes was developed from the 1929 single-engined *Moth* and, before that, the famed DH-4 of World War I. The final development of this biplane series was the four-engined *Express* airliner, powered by 205-hp *Gipsy Six* in-line engines, two on each lower wing. This airliner was still in scheduled service in the Fiji Islands as late as World War II days.

Occasionally, there is "reverse English" on this stretching procedure. Take the four-place Piper *Pacer* that was built around the Piper *Vagabond* two-placer with a wing that was chopped down from the original two-place *Cub* trainer. It is a proved aerodynamic principle that the span should be shortened as the horsepower is increased, and the 37 hp that *Cub* started with has now become 125 hp.

This scaling-down process was carried out with the Lockheed 12, which was itself a smaller version of the Lockheed 10. Then the trend went back again to larger equipment and the *Super Electra* Model 14 was slightly larger than either the 10 or 12. As more powerful engines became available, the Model 14 with six feet added to the fuselage jumped to the *Lodestar* or *Ventura* Model 18. This particular stretching job resulted in immediate aerodynamic problems, however, since the larger plane had a strong tendency to "nibble" with a rapid tail vibration. Research showed that the longer fuselage had put the tail in the downwash of the propeller slipstream at an unsymmetric mode of stabilizer bending and fuselage torsion that caused the vibration. By adding a "bat wing" flap along the trailing edge of the wing between the engine nacelles, and raising the tail slightly, this "nibbling" was immediately corrected. A change from a three-bladed to a four-bladed propeller would have accomplished the same thing since the "lumps" of energy coming off the propeller blades would have been in a different frequency and the tail section would not have vibrated.

Performance is sometimes improved by stretching an airplane. The T-33 trainer version of the F-80 is a good example. With the same wing, powerplant, and tail section, the two-place version is substantially faster than the original stubby unit. The smoother contour of the T-33 with its clean canopy is contrasted with the more angular canopy of the original airplane. In addition, more ram air was poured into the engine intakes by smoother fairing on the longer fuselage.

Actually, added speed is usually the least important item in stretching an airplane. A given wing can be pulled or pushed through

the air only about so fast, regardless of the amount of power used to do it, so the speed increases are usually very small. "Larger planes generally carry more passengers and/or cargo and often are able to fly greater distances," advises Bob Reedy. "Speed does not necessarily result from increase in size, but increasing fuselage length is an efficient and effective way of increasing capacity while retaining favorable performance characteristics."

Even the Model 1049 "Super Connie" is designed with an eye to the future. Since tip tanks are the easiest way to add fuel—and, surprisingly, cost only 2 or 3 mph drag at cruising speeds—considerable design time is being spent in that direction.

"It is probable," says Bob Reedy, "that turboprop engines will be installed on the *Super Constellation*. The large fuselage capacity will permit full utilization of the increased payload-carrying capacities of the turbo-powered airplane. In view of this, certain design features such as structural strength for higher speeds have been designed into the *Super Constellation*."

The wing of the *Constellation* had its beginning with the P-38 and will go to Mach 0.65 without encountering compressibility problems. That's roughly 500 mph at sea level. Since the design dive speed is 405 and the placard indicated red-line is 324 on the original "Connie," the beefed-up wing of the stretched airplane can handle a large boost in speed from the turboprop engines.

One of the best ways to show the growing pains of this large Lockheed transport is to show the changes in allowable take-off weight of the "Connie." The original L-049 model, a conversion of the surplus USAF C-69,, took off at 86,500 pounds gross. A new nose gear and forward fuselage modification brought the take-off weight of the later 049-D model to 96,000 pounds. One thousand one hundred thirty gallons of fuel were added in the outer wing panels of the L-149 to bring the take-off weight to an even 100,000 pounds. The 2200-hp Wright R-3350 *Cyclone* engine was replaced with the Wright C-18BD-1 with 2500 hp, more "beef" was added in the fuselage and inner wing, cabin superchargers, new propellers and a flap deflection increase added another 2,000 pounds to the take-off weight on the L-749 model. Twenty-ply tires and even more "beef" in the center section brought the all-up weight of the L-749-A to 107,000 pounds for a boost of 20,500 pounds over the original "Connie." The "Super Connie" is starting with an all-up weight of 120,000 pounds on the L-1049 with an additional 10,000 pound boost to be added on the "B" and "C" models with the turbo-compound Wright C-18DA-1 engine that delivers 3,250 hp on take-off.

Growing pains in the Lockheed line of aircraft has virtually been duplicated by its crosstown rival, Douglas. The fabulous "work horse of the Air Force," the C-47 or DC-3 was a direct outgrowth of the DC-2, with larger engines added to carry the greater cabin capacity. The Super DC-3 is another step along the same line. The DC-6 series is closely related to the proved DC-4 and C-54. Here again, larger powerplants have come first and the larger aircraft followed shortly thereafter.

Almost every company develops their planes along similar lines. The Boeing B-17, B-29, B-50 series was a logical development of the old Boeing 307 *Stratoliner* which completed the cycle by being the basic parent of the present-day Boeing *Stratocruiser*.

The whole history of aircraft design has a very deep footing in stretched aircraft. Early day designers naturally used hit-and-miss methods of developing their designs. Once they stumbled over an efficient combination, it was perfectly logical to build bigger and better airplanes from this proven foundation.

Just where do these aircraft growing pains end? The ultimate size of a passenger or cargo airliner is purely a matter of economics. "Considering the cost per seat mile or cost per ton mile, it is logical to offer the largest airplane which will maintain necessary schedule flexibility," says Bob Reedy.

"Time spent on the ground for loading and servicing is what governs the size of our passenger plane today," said TWA President Ralph S. Damon. "You wouldn't use an ocean liner for the 22-mile hop from Los Angeles to Catalina Island, because too much time would be wasted in docking, fueling and getting your passengers aboard. The same thing applies in air transportation."

One of the oldest axioms of aviation is that airplanes don't make any money sitting on the ground.

As larger, fully dependable powerplants are developed—whether it be reciprocating engine, turboprop, turbojet, pure jet or atomic variations—the airframe designers will stretch—and stretch again.

Incomparable

a pretty girl

Ample inspiration to make the lowliest of dubs a goal-crossing All American, Cynthia Hood is something of an athlete in her own right. She is an expert swimmer and is majoring in physical education at SMU. Cynthia is 19, has blue eyes and brown hair. (No. 1 in a series of pretty Dallas girls discovered and photographed for Southwest Airmotive).

Incomparable

A Gyro overhaul by Southwest Airmotive.

SOUTHWEST AIRMOTIVE COMPANY

LOVE FIELD • DALLAS

Air Navy . . .

(*Continued from page 11*)

feeling soon deserted the Chinese drivers. In a screaming, prancing and kicking mess of carts, mules and drivers, the *Skyraider* bullets cut them down. Warren's raiders were ready for more bear.

Surprised that the pilots still had any ammunition left, the ground controller sent them after more Communist troops. These were taken care of with equal dispatch. But Warren's work wasn't finished yet—on the way back to the carrier his flight sunk a river supply boat to round out the day.

During that same day of poor-weather operations, other Task Force 77 planes accounted for six road and rail bridges, two dozen Red military vehicles, over 20 rail freight cars and 10 supply dumps. Business like this has been the Air Navy's war in Korea.

Three years ago many thought the aircraft carrier was almost as dead as Hannibal's elephants. Fortunately, there were a few who disagreed. When Uncle Joe tried to pull his "quickie" conquest of Korea, it was a mighty good thing for Uncle Sam that those few stuck to their guns—aircraft carriers remained a handy thing to have around.

Panther jets, *Skyraiders* and *Corsairs* of Carrier-Air Group Five, based aboard the *Valley Forge*, hit the Red capital of Pyongyang on July 3rd and 4th, 1950, for the first major naval strike of the war just a few days after the Communist hordes poured over the 38th parallel. A succession of carriers picking up war experience have been in action ever since, in the alternately dusty-muddy, hot-frigid, bloody and slogging slugfest over the ancient Hermit Kingdom.

By our standards, there never was much in Korea. The few modern facilities placed there by the Japs during their 40-year occupation were soon erased by war. The job of our air power in Korea resolved to the slow, methodical, oft-repeated business of killing enemy troops, blasting trains and other communications, and blowing bridges. Sure, there was a bit of air opposition—a few Yaks at the beginning, and some Migs later on in the far northwest sector—but the real job was elsewhere: at the fighting line or close behind it.

The second month of fighting in Korea found our forces backed into the "Pusan Perimeter." That was August 1950. Many were wondering if they wouldn't soon be manning a fleet to evacuate our troops in another Dunkirk. These fears proved to be unfounded. More troops were pouring into the peninsula, and aircraft carriers were on the scene.

Pull out some of last year's war maps. Take a good look. There wasn't much ground left to us in the "Perimeter," and there weren't many airfields either.

Most of the land-based airpower was flying to the Korean front from bases in southwestern Japan, like Itazuke on Kyushu. By the time enough fuel had been put aboard to reach the target and get back again there wasn't much room left for the all important bombs, rockets and machine-gun ammunition. Furthermore, a pilot can't just fly directly from a base in Japan to a target in Korea, let go one heroic salvo to save the day, and fly back home again.

NAVY CUTLASS, designed and built by Chance Vought, takes off as it is catapulted from the deck of the *USS Midway* during test and evaluation exercises being conducted at sea

When you're supporting ground troops, you have to orbit around until the guys on the ground tell *you* what *they* want hit. Then you have to fiddle around a little bit more, making sure you have the right spot to hit so you won't plaster your own men. Then you hit 'em, and hit 'em hard. If you've used up all your payload in fuel to fly from Japan, you don't have much of the wherewithal with which to hit 'em. This is where the carriers came in.

During the days when we were wondering whether or not we were going to be pushed into the Sea of Japan, we had two escort carriers, the *Badoeng Strait* and the *Sicily*, and the big Essex-Class *Valley Forge* and *Philippine Sea*. For a while at this stage of the war the *Boxer* was on the job. Later the *Leyte, Bataan, Princeton, Bonne Homme Richard* and the *Boxer* again came into the picture.

The *Valley Forge* and *Philippine Sea* with concentrated supporting firepower from escorting ships such as the *Missouri*, some cruisers and numerous destroyers operated at that time as Task Force 77, keeping an umbrella of airpower over our ground troops hanging on so desperately. The little *Badoeng Strait* and *Sicily*, with Marine squadrons aboard, stuck in close to the "beach" and maintained a shuttle of close-air-support *Corsairs* between them and the front.

Korea is a peninsula, ideal for carrier operations. No place on it is much over a 100 miles from carrier operating areas—the deep blue sea. Weather, always a factor to be considered in air operations, was not much of a bogey man in Korean carrier operations either. If it were bad in the Sea of Japan, carriers just swung over into the Yellow Sea to operate or, if it were bad there, they'd go somewhere else where it was good. In short, the carrier's mobility made it possible to find fit operating weather within easy range of the target.

It was our Air Navy that covered the Marine-Army landings at Inchon last fall which enabled UN forces to make their successful breakout from the "Perimeter" and start the drive to the Yalu. Carrier air had a hand, too, in the successful evacuation of the Tenth Corps from the Chosin Reservoir when the Chinese treacherously entered the war last November.

Few air strikes in Korea were the big mass-attack types so familiar in World War II. As many planes would be involved in the same day, but not on the same target. Normally, a five-plane section of *Skyraiders* or *Corsairs* would orbit over the fighting up and down the front while *Panther*-jet flights were flying armed reconnaissance and deep support missions behind enemy lines.

When our infantrymen would run into a stiff resistance pocket, the call would usually go out for air support. On call, the heavily loaded *Skyraiders* or *Corsairs* would roar in over the target area.

While the flight circled at altitude, the forward air controller with the infantry would be instructing the flight leader where to locate specific targets, "We're getting heavy mortar fire from behind that shack on the hillside. See if you can get him."

One plane would go roaring down to fire a marking smoke-rocket at the house while the rest of the flight remained at altitude.

"No, that's not it. It's by the other house," crackled the controller's voice.

With this, a second aircraft would be on its way to mark the second house with a smoke-rocket while plane number one was returning to altitude. Usually the second run was unnecessary.

"That's it," confirmed the controller. One at a time the dark blue planes peeled off in a dive to pour rockets, bombs or napalm on the Communist resistance spot.

With enthusiastic shouting, the controller reported, "You got him. We're going in now."

Once again the planes were back circling at altitude, ready for another target . . . and so it went ridge after ridge in Korea.

The nearest thing in the Korean War to the massed day-long carrier strikes perfected by Adm. Marc Mitscher's task force of World War II, came off this July when the *Boxer* and *Bonne Homme Richard* teamed up for a dawn-to-dark battering of the important North Korean port city, Wonsan.

Even though the truce talks were then underway, the Communists were using Wonsan as a major supply build-up point and troop-training area. The place had been under naval blockade for months and the Reds were busy installing heavy guns in an effort to break it. Task Force 77 Commander, Rear Adm. William G. Tomlinson, USN, got orders to break it up—this he did by unleashing his day-long punch.

Catching the Reds by surprise, the *Panther*-jets, *Corsairs* and *Skyraiders* dove out of the sky for lethal attacks on their previously assigned targets. As ammunition was expended, new flights arrived on station to relieve the early arrivals, while they shuttled off to the carriers to reload and return again. By nightfall, Wonsan was in shambles.

More typical of Korean carrier air war was a recent close-air-support strike in the vicinity of Inje. Well dug-in Communist troops along the ridges were holding down our advance. Our forward air controller on the ground called for air support. Among the *Corsair* and *Skyraider* pilots from the *Boxer* answering his call were Lieuts. Tom Owen of Memphis, Tenn., and John Topliff of Alpine, Fla.

In repeated dive bombing and strafing attacks Owen, Topliff and their squadron mates covered the Communist ridge so thoroughly with napalm, bombs, and machine-gun fire that the controller couldn't see the results because of the heavy fires and smoke. Later, when the smoke of battle cleared, our troops moved onto the ridge and found about 225 dead and wounded Red troops on the field.

Lieut. Joe Stewart of Olathe, Kans., on another strike from the *Boxer*, got an "excellent job" report from the controller for helping stop an enemy mortar barrage.

Not so typical, but perhaps more exciting was a *Panther*-MIG-15 clash over Sinuiju soon after the Chinese entered the war when Lt. Comdr. Tom Amen, skipper of the *Philippine Sea's* Fighting Squadron 111, knocked down his Red opponent. This was the second MIG destroyed by an American pilot. We learned a lesson from Amen's victory, too! Our planes aren't necessarily better than the enemy's simply because ours were made in the USA, but fortunately, for the time being at least, our pilots are.

The day before the battle various experts were giving the assembled pilots of VF-111 "the word" on aerial gunnery. After everybody was finished and there wasn't even a question left in the mind of the newest pilot, Amen stepped up to the front of the room and advised, "Remember what you've been told here, but remember this too, you won't be shooting anything down unless you get right in close. Don't fire before you're in range."

Next morning Lt. Comdr. Amen and his *Panthers* were providing combat air patrol over the slower *Corsairs* and *Skyraiders* blasting the Sinuiju-Antung bridges across the Yalu. It wasn't long before the prop-planes were jumped by MIGs based just over the river in Manchuria.

In the melee that followed Amen got his MIG. It was out-performing his *Panther* up and down, around and around, but the Red pilot was inexperienced or stupid. He pulled a trick that no good fighter pilot would consider—after shooting past the *Panther* without a hit, he put his speeding MIG into a wide easy turn. Amen turned too, inside of him, closing the range to point blank. Amen pressed his trigger and that was the end of Mr. MIG.

While Korea has not been a "jet war" because of lack of heavy enemy air opposition, it has seen the use of jets aboard carriers perfected. Jets aboard ship pose no more problems than any other types of carrier-borne planes, and what problems there were have been whipped. Jet maintenance is easier, new catapults can launch them in a hurry, the Davis barrier stops them safely, and battle experience has given us battle knowledge.

Korea has not been a "jet war" because the heavy work-a-day burden of ground support fell upon the better adapted *Skyraiders* and *Corsairs*. They carried the load and were almost constantly over our troops to pound Red opposition. Of course, if there had been more enemy planes in the air, the story may have been different.

Perhaps the outstanding plane to emerge from the Korean War is the Douglas AD *Skyraider*. This one-engine-and-one-man (usually) plane carries approximately the same ammunition load as World War II's B-17. The old Chance-Vought F4U *Corsair* held its own as a good close-support plane too, especially in the hands of Marines who swear by them.

For the past five years the Navy has been saying that its Naval Air Reserve is good. The Korean War proved this beyond a shadow of a doubt. Within weeks after the war started, Naval-Marine Air Reservists were in action over the fighting front.

In June, 1951, almost every third American plane flying combat in Korea was flown by a recalled Naval or Marine reserve aviator. During that month better than 40 per cent of all combat flights by American pilots were Navy or Marine. This means Navy and Marine pilots made about 36,000 combat runs on the Reds during June. Of the Navy total, 74 per cent were flown by Naval Reservists; half the pilots on the *Princeton*, 90 per cent of those on the *Boxer*, and all of those on the *Bonne Homme Richard* were reserves. Half of the patrol squadrons fighting in Korea are activated reserve squadrons. Of the Marine total, 48 per cent of the combat flights were made by Marine Reserves. Stating the whole thing another way, about 750 runs a day against the enemy were made by former "Weekend Warriors" of Naval-Marine Air Reserve.

No story of the Naval air war in Korea would be complete without mentioning that bird-of-all-trades, the helicopter. The Navy uses them for practically everything. Carriers use them as plane guards to fish downed pilots out of the drink, or to snatch them from the enemy. They are used for gunfire

(*Continued on page 60*)

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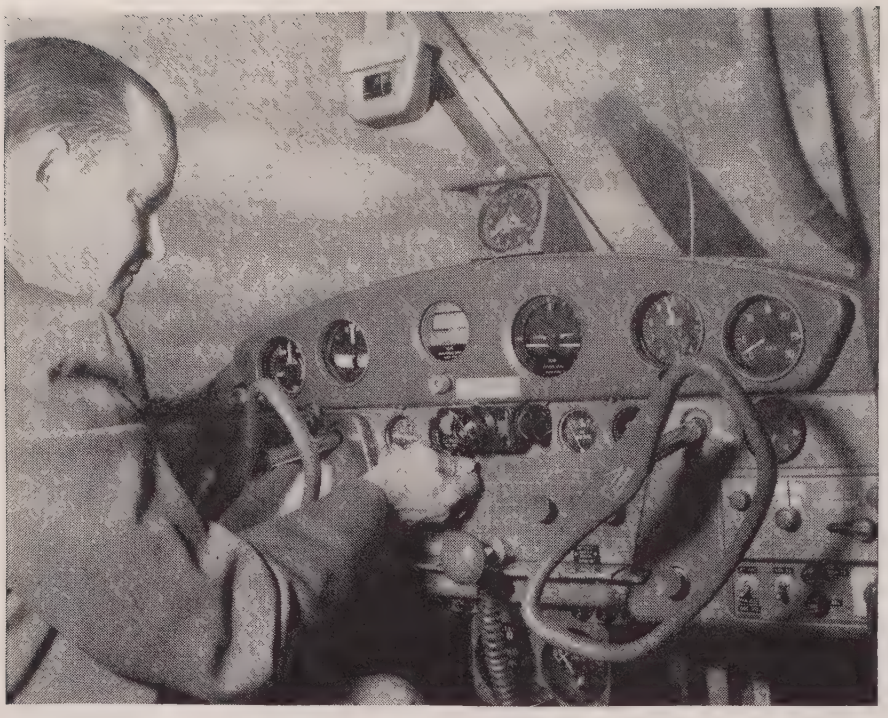


CESSNA 170 *(above)* **is first one to be equipped with Lear L-2 Autopilot. Plane is owned by Edw. Chadderton** *(shown at controls)* **who is auto dealer as well as air service owner**

HANGAR FLYING

Lethal Cocktail

Here's an important report from Flight Safety Foundation:

"The refueling of aircraft is done so frequently that operators may be inclined to regard it as an event of minor importance (aside from being sure that proper quantities are on board). The chances of fuel contamination and of fire, however, are very great. It is a tribute to the efficiency of the oil companies and airline ramp personnel that accidents are so rare."

But accidents do happen where water is pumped into aircraft fuel tanks instead of gasoline. FSC reports:

"Fortunately, a careful and definite check for water is the rule rather than the exception. In addition to daily checking the storage tanks for water, a check should be made after a dispensing truck is refueled. If there is the least doubt that this is being done, a pilot or mechanic should check the aircraft fuel tanks after each refueling of the airplane, by draining the sumps to check for water.

One oil company recommends the following:

1. Storage Tanks—Drained once a day and 15 minutes after storage tank is filled.
2. Tank to truck pumps—Should have a dehydrator.
3. Truck—Should have sumps and sight glasses. Glasses are checked visually and sumps drained before refueling any aircraft and each time truck is filled.
4. Hydrant system—Should have 5 micron filters.
   Sumps—Look and drain before refueling aircraft.
5. Aircraft—Before warming up, a mechanic or flight engineer should open drains to check for water.

We are indebted to Flight Safety Foundation for its continuous efforts in the direction of perfect records for all aviation.

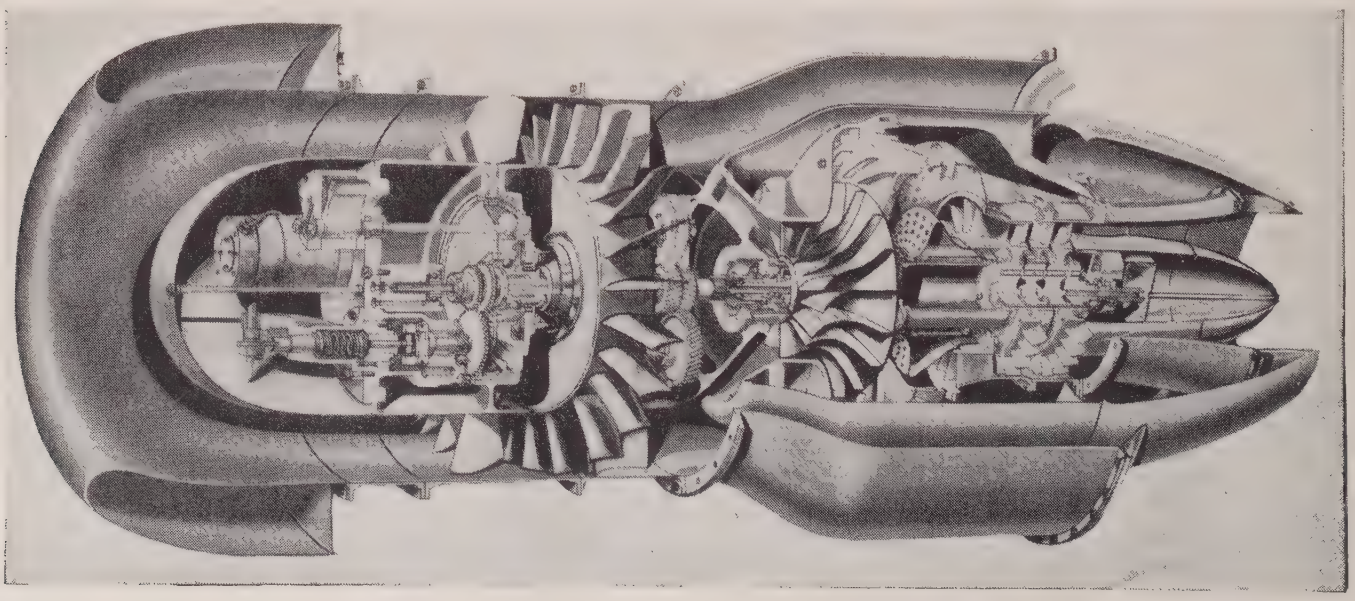
Record Maker

Max Conrad has added another non-stop flight to his logbook . . . . in fact, he has added two: from Winona, Minn., to Mexico City, and return from Mexico City to Washington, D.C. Like his other flights, these two were made in his Piper *Pacer* N7330K. Conrad took off from Winona at 3 pm, and arrived in Mexico City the next morning at 9:59 am, just 18 hours and 45 minutes later. On the return flight, Gonrad left Mexico City in the heat of the day, just 12 minutes after noon, off a runway 7400 feet above sea level. Despite a gas load of 175 gallons which meant an overload of some 500 pounds, the *Pacer* was airborne after rolling just two-thirds of the runway. Conrad reached Washington at 9:12 am the following morning. The *Pacer* is a stock model powered by 125-hp Lycoming, modified only to the extent of having two extra gas tanks installed where the plane's rear seat is normally.

Dusting and Spraying Survey

Important new information concerning pilot employment in crop dusting and spraying has been obtained from a survey conducted by the National Aviation Trades Association and analyzed by CAA. The analysis shows:

DUCTED FAN gas turbine *(below)* **is to be built in U.S. by Continental Motors; would give four-placer a cruising speed of 300 mph**



THOMPSON TROPHY winner at Detroit races was Col. Fred Ascani; speed: 628.9 mph

1. More than 6400 pilots do dusting and spraying. This is almost as many pilots as are employed by the airlines (7,250 in 1950).
2. For this type of flying, 1,000 hours of previous pilot experience is required, and operators maintain it takes a season and a half to train a pilot who has this prerequisite.
3. More than 60 per cent of the pilots having such skill are subject to military call as reservists or under the draft.

Discussing this percentage, Charles F. Horne, CAA Administrator, reported that "possible call to military service of large numbers of crop dusting and spraying pilots is perhaps the chief hazard to the continuation and growth of agricultural flying."

Police Aid

Colorado is cooperating with CAA in making it easier for pilots to file and close flight plans. Pilots now can open or close a flight plan with a Colorado state highway patrolman or a patrol radio station. The opening or closing is then radioed to the highway patrol station in Denver which turns it over to the CAA Denver station. CAA officials claim the new plan will eliminate many unnecessary searches resulting from the shortage of reporting facilities. Under this new arrangement, one patrol station alone —at Durango—handled 20 flight plans in the first five days the arrangement was in effect.

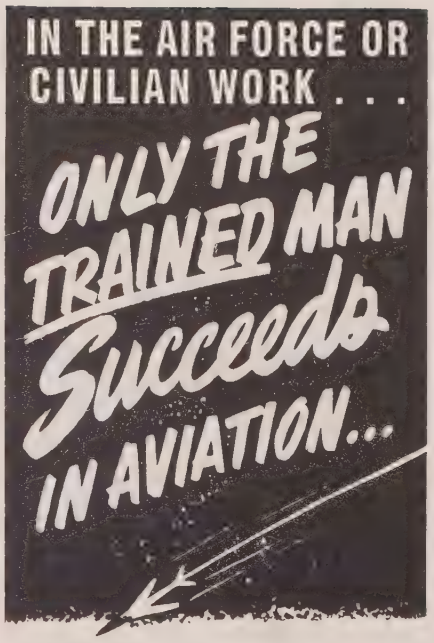
Jets by Continental

Continental Motors Corp. has purchased from Societe Turbomeca, of Bordes, France, exclusive United States manufacturing rights to a family of nine gas turbines developed under the sponsorship of the French Air Ministry. These turbines span a horsepower range of from 200 to 1100, and are now ready for production after tests in actual use.

One turbine model, a ducted fan, when installed in a four-place aircraft with characteristics about the same as present airplanes of that type, will make possible a cruising speed of about 300 mph, compared with the present 170 mph.

	Complete Aircraft			Manufacturer's Net Billing Price		
	Shipments			Shipments		
	TOTAL Jan-Jul.	July	June	TOTAL Jan-Jul	July	June
				(thousands of dollars)		
Aeronca						
Champion 90 hp	12	2	--			
Sedan	19	1	--	97	8	--
7CCM[a]/	2	--	--			
Beech						
Bonanza	231	36	36	5,057	612	796
D-18	37	3	6			
Bellanca						
Cruisemaster	8	--	1	76	--	9
Call Air - Call Air	1	1	--	4	4	--
Cessna						
140A	38	1	1			
170A	272	41	46	2,435	293	304
190	15	2	4			
195	51	4	--			
Luscombe						
GC-1B	9[b]/	1	--	91[b]/	4	--
8F	19	--	--			
Mooney - M-18	14	2	--	25	4	--
Piper						
Family Cruiser	1	1	--			
Tandem Trainer	325	45	48	2,714	399	438
Pacer	444	58	66			
Clipper	1	--	--			
Taylorcraft						
Sportsman	9	1	1	20	3	3
TOTAL	1,618[c]/	199	209	11,754[c]/	1,327	1,550

a/ Military type aircraft sold to other than U.S. Military Customers.
b/ Includes 7 GC-1B's valued at $27,000 shipped by Texas Engineering Corp.
c/ Includes 6 Model "G" valued at $20,000 shipped by Engineering & Research and 104 Navions valued at $1,215,000 shipped by Ryan.



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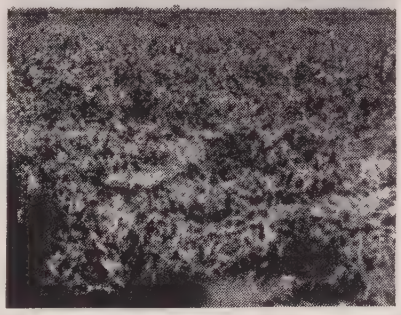
PILOT on "blackbird patrol" uses flying technique of duster pilots

Lightplane Blackbird Patrol



A new service by lightplane could be called "blackbird shoo-ing." In Florida, corn is becoming one of the major crops, but along with the corn has come a quantity of blackbirds to menace the success of the crop. Farmers are ridding themselves of the birdaboo, however, by plane. They pay from $6 to $10 per hour for the services of a Cub or an Aeronca. The plane flies back and forth across the field and just above the tops of the corn. The birds, feeding on the crop, don't like the disturbance, and so fly out of there. It's monotonous flying for the pilots, but it's paying off for him and the farmer, too, in more $$$.

Flying Commissioner

(*Continued from page 35*)

dollars through use of company planes are now innumerable, Mr. Lowe finds his Stinson's value to the Lowe Paper Company is chiefly as a "sales persuader."

"Once in a while we have a hurry-up call to some distant point," he says, "when the airplane comes in handy. But it really pays off as a 'sales persuader.' We've clinched many a business deal while taking the prospect for a flight, and we're convinced that the novel entertainment value of an airplane trip is a considerable sales help."

Mr. Lowe's humming paper plant is located in Ridgefield, N. J., a ten-minute drive from the PA's bustling Teterboro Air Terminal. When business callers are on hand as lunchtime rolls around, a trip to the airport is usually in order.

That's where the airplane as a sales weapon comes into play. Where other less imaginative industrialists might take their customers to the nearby country club for lunch, Mr. Lowe flies them over to Idlewild—the PA's newest and largest facility which, incidentally, boasts a most continental restaurant.

The combination of a pleasant, personalized airplane ride, a fine luncheon, and a behind-the-scenes tour of the world's greatest airport must be a great sales tonic. At any rate, Lowe Paper is booming, nowadays.

Before the PA got its helicopter this June, Mr. Lowe often pressed his Stinson into official service for aerial surveys of the Authority's vast holdings in the New York metropolitan area. Whenever it was felt that such matters as traffic-flow patterns into and over the PA's bridges needed looking into, the flying commissioner acted as a volunteer bottleneck-spotter.

Flying low and slow, the commissioner could keep tabs on the PA domain in a way impossible in the Authority's faster planes or by ground parties. Now the helicopter does the same job in even more efficient fashion. Besides, it provides fast transportation between PA headquarters on Eighth Avenue and any of the Authority's outposts.

That same helicopter, Mr. Lowe feels, may help the Port Authority solve a bugaboo which has been plaguing commercial aviation for many years—how to bring airports within reach of population centers. Eventually, the commissioner believes, helicopter hops to the airport from mid-city embarkation points will be S O P for long-distance air travelers.

If the PA's helicopter can operate from atop a 16-story mid-Manhattan building as a matter of routine—and it does, every day—then the windmills can do so from other buildings in other cities, he says.

Thus, if the Port Authority theory is correct, airline passengers eventually will board a helicopter instead of an airport bus. And they'll be at the field, ready to embark on their cross-country or oceanic airliner in a matter of minutes even if future airports are built even farther away from town than those of today.

Mr. Lowe's inaugural trip in the PA helicopter demonstrates the soundness of the idea. Less than eight minutes from take-off in Manhattan, the commissioner stepped out on the apron at Newark Airport. By airport

FIRST FLIGHT passengers Tobin and Lowe shake hands with the PA helicopter's pilot Leopold

bus, it takes a good 30 minutes or more.

Even more significant than the convenience for city-to-port travelers, the helicopter may be the means of opening up whole new areas to the benefits of air travel, Mr. Lowe and his fellow-commissioners believe.

For instance, a great many sizeable towns in suburban New Jersey are a good two hours from Newark Airport by surface transportation. People who live there have really got to *want* to fly, to make that journey to the nearest airline. For a great many of them, it's a lot easier to drive to the handy railroad station and board the Pullman.

But if a scheduled helicopter can pick a passenger up on the village green and whisk him to Newark Airport in 10 minutes, he'll go by airline on that trip. At least, the Port Authority hopes so.

The same thinking, of course, would apply to Westchester, Connecticut and Long Island points in relation to LaGuardia Field or N. Y. International (Idlewild) . . . or the hundreds of other air-transport facilties serving hundreds of other population centers all over the country. At present, they all have one thing in common—airfields too far from town.

Unless, of course, you're in the enviable position held by Commissioner Lowe. The Lowe plant was erected years before Teterboro Airport was launched in the meadows a couple of miles away, and the field itself had been in operation for a good many years before the busy industrialist got around to flying. Now, though, he's taking advantage of the convenient geographical juxtaposition of plant and field to the hilt, making at least one hop every day, weather permitting.

"I always wanted to fly, even in the days before Teterboro," he says. "I wanted to fly in World War I, but the Army wouldn't give me a chance. I was a chemical engineer, so I was assigned to a project involving the fixation of atmospheric nitrogen, of all things!"

Business and family responsibilities—running the paper mill and raising four daughters—kept flying in the pipe-dream stage until 1946. Then he started taking lessons at Teterboro, soloed in 13 hours, and bought an Aeronca to finish qualifying for his private ticket. Subsequently, he turned it in on the Stinson flying station wagon.

"I have no illusions about this hobby of mine," he says. "People ask me why I don't move up to something hotter, like a *Navion* or *Bonanza*. I leave that up to the youngsters—the Stinson is just right for a flying grandfather. It's a forgiving airplane; makes a lot of allowances for any idiosyncracies I may have."

The commissioner has notched a couple of "firsts" during his 500 flying hours. His tiny Stinson was the first aircraft to land on the sea of concrete that is New York International Airport after the Port Authority took over and, of course, he helped pioneer the PA's helicopter act.

And, while he isn't the first grandfather to own and fly his own plane, he has one more laudable objective: to be the oldest.

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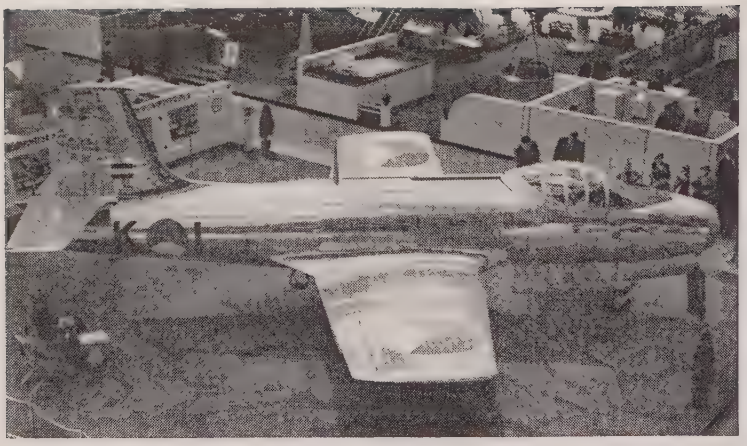
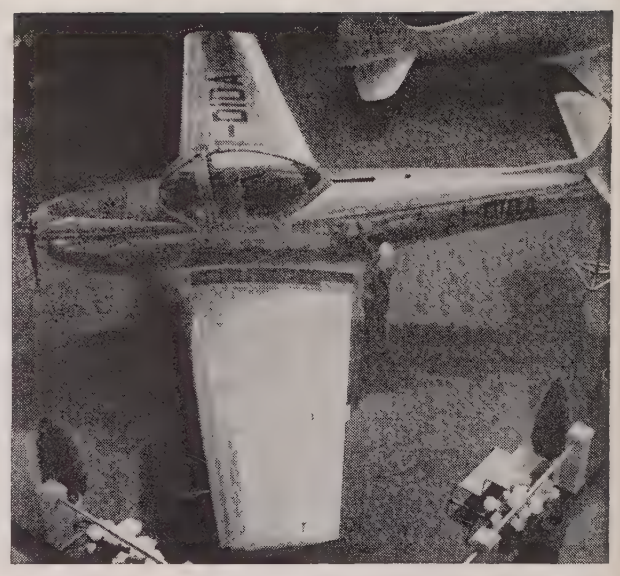


DUTCH jet trainer, Fokker S-14, is powered by *Derwent* 9 turbojet (3600 pounds thrust). Plane will seat two: instructor and student. Top speed is 440 mph

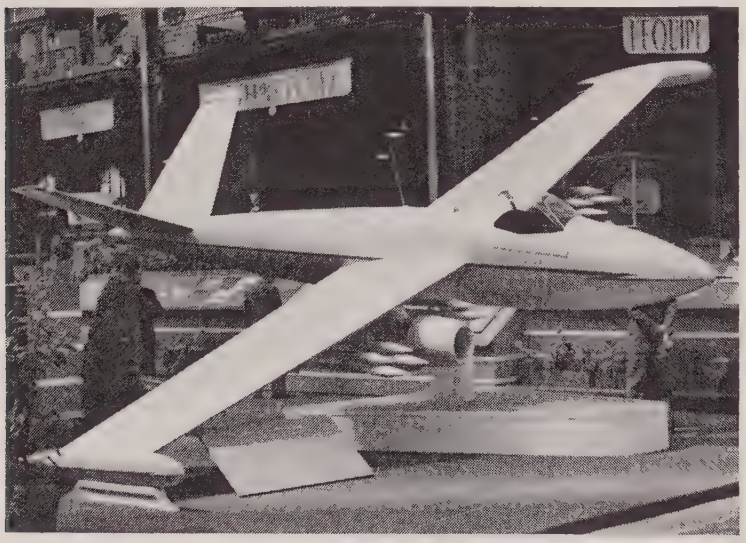


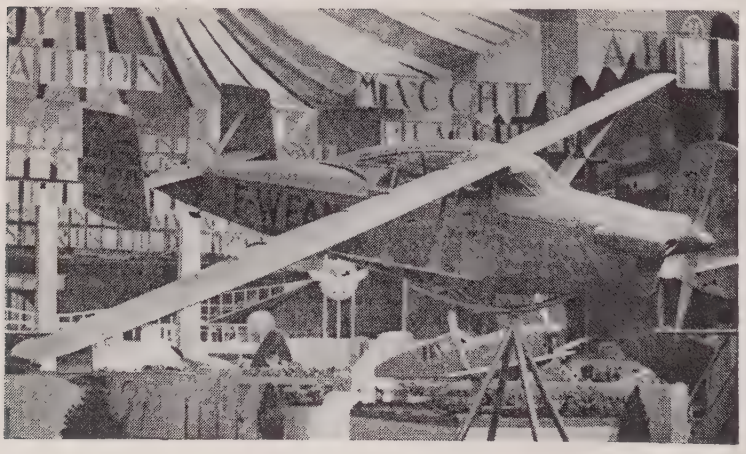
ITALIAN trainer *(right)*, the Piaggio P-148, is a two-place basic trainer powered by 190-hp Lycoming engine. It has a top speed of 147 mph, sea level

Paris Air Show

FRENCH light jet trainer is the Fouga CM-82R *Lutin*, a three-quarter flying scale model of CM-821-R. *Lutin (below)* is powered by two Turbomeca *Palas* jets

VEMA 51 *(right)* is light twin powered by two 205-hp Continental engines. It seats six, has top speed of 200 mph, a cruising range of 994 miles



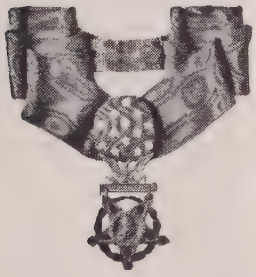


RESEARCH monoplane is the Hurel-Dubois HD-10 *(left)* fitted with 75-hp Praga D engine. It features ultra high aspect ratio wing

REY R-1 *(above)* features an articulated wing: wing is mounted on rubber, has upward, downward movement. The R-1 is experimental

French aviation industry recently put on a show at the 19th International Air Salon in Paris. On display were prototypes of many European designs, both military and civil, but few of which probably will ever go into production. Covering the display for SKYWAYS was William Green, well-known British contributor to the magazine.

Medal of Honor



Major General William F. Dean, of Berkeley, California--Medal of Honor. In the hard early days of the Korean War, when it was Red armor against American rifles, General Dean chose to fight in the most seriously threatened parts of the line with his men. At Taejon, just before his position was overrun, he was last seen hurling hand grenades defiantly at tanks.

General William Dean knew in his heart that it's every man's duty to defend America. You know it, too. The General's job was in Korea and he did it superbly well. Your defense job is here at home. And one of the best ways to do that job is to start right now buying your full share of United States Defense* Bonds. For remember, your Defense Bonds help keep America *strong*, just as soldiers like General Dean keep America safe. And only through America's strength can your nation . . . and your family . . . and you . . . have a life of security.

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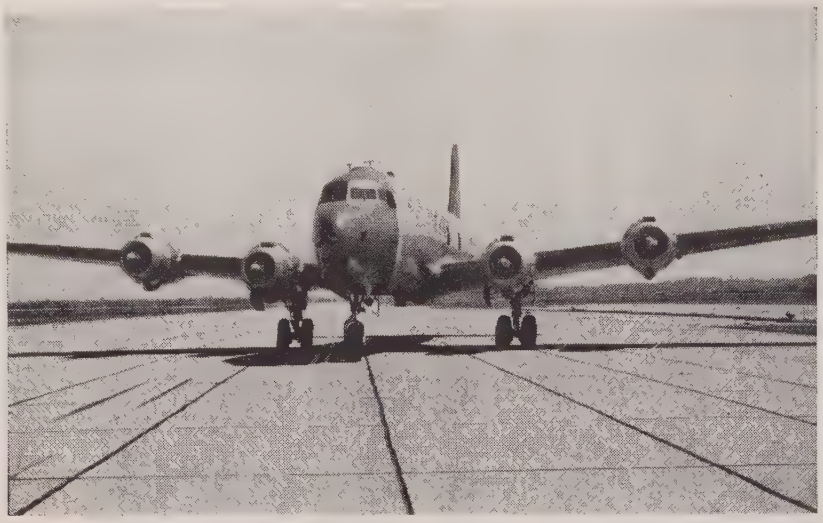
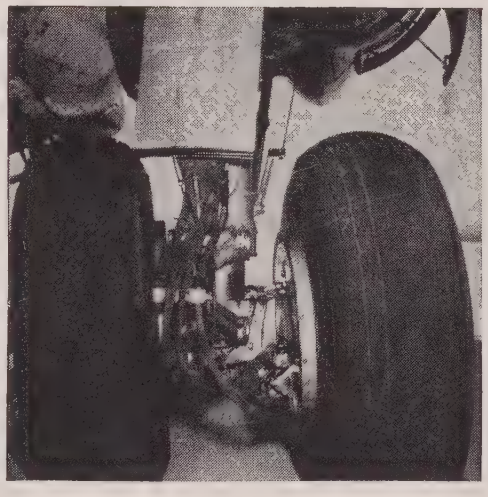


CROSSWIND GEAR



Successful test flights of C-54 with crosswind gear built by the Goodyear Tire and Rubber Company recently were completed at Wright-Patterson AFB. Goodyear crosswind gear design includes entire castering mechanism within wheel itself. Caster limits on C-54 are 15° on either side of center. An hydraulic centering device makes sure wheels are in line with the longitudinal axis of plane prior to retraction. Wheels won't retract unless centered. Toggle switch in cockpit enables pilot to select either free castering or fixed wheel condition either in flight or when plane is on the ground.

Flight-Test Changes

(*Continued from page 27*)

toward some destination, mark his check points, call the weather station for a report and, in short, do a good job of pre-flight preparation. When he has finished his chart and planning work, the student then is expected to prepare his ship for a X-C flight of the length plotted. This will include inspection, oil and gas consumption knowledge and supply, and other common-sense items.

In the air the student will settle down on his course and watch for his first check point 5, 10, or 15 miles out. When he hits his first check point, he will show whether he has estimated the wind drift correctly and, if not, alter his heading slightly to take care of extra wind.

After this, the examiner will ask him to pick an alternate airport and, airplane and chart in hand, plot a course toward the nearest field. If the heading he turns to agrees with the correct one in the inspector's mind, everything is rosy. The student is on his way toward winning his private certificate.

In the early stages this turning to an alternate in flight probably will lose not only students but instructors. Brackets are still the most effective preventative to staying lost too long. Hem your area in with mental fences such as railroads, mountains, and rivers—and watch for them! Always know where to turn to "find" yourself quickest. In the D. C. area, for example, students who are "lost" are trained to locate the Potomac river and then narrow their search down to Washington and the home airport.

Stalls: Stalls have had their faces lifted, or more accurately, their noses lifted. As a result of the stall research described in this magazine some issues ago (*March, 1951*), the CAA has embarked on a pilot-education program to spread the gospel of the improved stall-recovery methods.

Applicants will be asked, as a part of the private test, to demonstrate a partial stall—one in which the airplane almost stalls but does not "break"—with a nose-on-the-horizon recovery and adding full power.

Ailerons and rudder may be used, though the accent is still on the rudder to maintain directional control. Great stress is laid on keeping the stalls all headed and recovered in a constant direction.

A second stall, the normal, will be requested. In the normal stall the nose will definitely drop in the "break." This stall necessitates a little more nosing down to a point just below the horizon, again using full power, and coordinated rudder and aileron.

The last stall in the series is the complete one—in which the nose is allowed to drop all the way to the horizon, stick fully back—before any recovery is started. Then the nose will be dropped a little below the normal glide path of the airplane and full power and coordinated controls used.

Both power-on and power-off stalls will be required from all normally anticipated flight attitudes, which will probably include climbs, turns and glides.

Forced Landings: Forced landings are no longer to be practiced away from the airport. Statistics reveal that more accidents have resulted from emergency-landing *practice* than from emergencies themselves. The cure for this is so obvious we wonder why it hasn't been done before.

If a student can demonstrate a landing from a 180°-approach position to the airport with the engine throttled back, he has shown himself competent to take care of himself in case of engine failure.

Landings: Landings on the test will be okayed if the applicant lands within about the first half of the field, with the limits in feet completely discarded. He may use his throttle and flaps as required (another change), though obvious errors and late corrections which need great bursts of power will not be considered good practice.

Crosswind landings also are included in the test. Wheel landings and power-approach, tail-low, rough-field landings will have to be demonstrated to the examiner before the applicant is awarded his license.

Take-offs: These follow the same pattern as landings, with normal, rough-field and crosswind take-offs required for the private-pilot flight test. Rough-field take-offs, by the way, on tricycle-gear ships means getting the nose wheel out and staggering into the air as soon as possible, then using gentle control movements until a little speed builds up. On conventional gear ships, it amounts to much the same thing: tail-low to prevent nose-over and into the air without delay.

Maneuvering, Minimum Speed: Slow flight will be required not only in straight-ahead and turning flight but in climbing and gliding turns as well. Another new twist is the CAA's direction to examiners to close the throttle at least once during minimum-speed maneuvering to see if the plane stalls, which it will if it really is being flown as slowly as possible.

Pylons: These will be flown around one pylon only with the major interest of the examiner directed toward distracting the student's attention from his task of flying the pylon and ascertaining the student's ability to fly at a safe speed, holding his altitude subconsciously. Pylons will be the "constant distance from the pylon" type and will be flown from 500 feet up, depending on the congestion of the practice area.

Miscellaneous: Other maneuvers to be required, 720's, pre-flight inspection and run-up, general smoothness and coordination,

climbing turns, climbs and glides will be done the same as in past tests.

Time and Experience Requirements: To qualify for a private, the applicant needs 15 hours of dual instruction, five of which must be cross-country instruction, and 20 hours of solo. Ten of his solo hours must also be cross-country.

One solo cross-country must take the student to a point at least 100 miles from his home 'port and all landings, to count as one of the three required, must be at fields at least 25 miles out from home base.

Approved schools give the student less time, with a certificate of graduation proving that his course has been supervised by the school.

Commercial Pilots: In the CAA and CAB mill are regulations relative to commercial pilot certificates which—if no one screams—will soon become effective.

Should CAB's proposed regulation change go through, pilots after commercial tickets must show proof of five hours of night flying and 10 hours of instrument instruction—probably five hours in a Link, and five in actual flight. Present commercial ticket holders have not had to worry about this requirement.

Also boiling away in the regulation factory is a proposed ruling to require all airmen (pilots, flight mechanics, tower operators, etc.) to renew certificates every 24 months. Should this become law, present holders of certificates will not need to meet additional requirements but will simply send in for their new certificates each 24 months.

This every-other-year renewal will give CAA some way of telling how many certificates are in effect. Today, records do not show whether a pilot is active, "daid," or anything else.

Already, the new stall-education program is yielding a harvest of safety statistics. A CAA *Cub* is currently trotting around the regions (it has covered four so far) demonstrating the new stall-recovery methods. Hundreds of flights have been made and pilots, seeing the actual in-flight results in altitude savings, are amazed. Stall accidents already have decreased in the four CAA regions where the demonstrations have been held. In other regions stall accidents have taken their usual spring and summer up-swing!

The CAA *Cub* is equipped with a helicopter airspeed indicator which shows speeds as slow as 20 mph, a very sensitive altimeter, and angle of attack indicators which prove what the demonstrators claim for the new stall-recovery methods.

In one Kentucky area, CAA says, it was found that *most flight examiners* were wasting about 125 feet of altitude in stall recoveries!

Yes, the new flight test is a different animal altogether. Most airport operators are happy about it. Those who say that rather scant time is allotted to teach flight maneuvers are reminded that these recommendations are *minimum* times, not normal or slow-learning times. Those students who can take the test with minimum time will be sent up. Those who are a bit more leisurely in absorbing the training will both want and need a few more hours before attempting the test. The written, aside from the time-inconvenience problem, is also warmly welcomed by instructors. A little larn'in ain't goin' to hurt . . . much.

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11-51

Dilbert

(*Continued from page 30*)

can drop into a shorter field than you can fly out of. The trick in getting out of a small field is to become airborne in the shortest possible distance. Here's how to knock 25 per cent off of your normal run:

a. Set flaps for take-off and hold brakes until take-off horsepower is developed.

b. Get the tail up as early in the run as possible, holding full forward stick in heavy planes, if necessary. (Impractical in certain models due to lack of directional control.)

c. Accelerate with the thrust line approximately level.

d. On approaching take-off speed, increase the angle of attack at such a rate that a three-point attitude is reached at the moment of becoming airborne.

e. Retract landing gear as soon as practicable. Set flaps for best climb.

f. If your flap control is where you can easily manipulate it during take-off, you can decrease your take-off distance an additional six per cent by leaving your flaps up until reaching approximately 75 per cent of take-off speed. Prior to that it merely acts as a drag.

Please don't misunderstand; this is not an invitation to try to fly out of small fields, á la Dilbert. In the first place, if you are ever forced down, be *absolutely* certain the trouble has been corrected before you try to get out. You must know the flight characteristics of your ship before you can make an intelligent estimate of your chances. Step off your distances and note the height of surrounding obstacles. Look your field over carefully; it will be rougher than your home airport and will require a correspondingly longer run.

If any doubt exists about the ability of your airplane (your airplane's ability, mind, not yours) to make it, *don't try*. Be intelligent and get towed out. It probably will be the quickest way to get airborne—and much cheaper in the end.

Gremlinitis—The atom bomb has nothing on Dilbert. He recently set off a chain reaction that upset three states.

He did it with his little pencil. He left it in his pocket instead of using it to file an arrival report after completing a 600-mile cross-country.

Came darkness and Dilbert's home field queried the point of destination as to his arrival. "Nobody by that name reported in here," quoth that point. Granted the P.O.D. personnel had had a busy day, but they should have known that Dilbert's plane landed on their field, even if they didn't know he was at that moment eating popcorn in the balcony of the Bijou, his best girl nestling on his left shoulder and his pencil ditto in his breast pocket.

Anyway, that message started things rolling. Dilbert must be down some place enroute—but where? A coordinated air search was started, including all available local pilots and the military aircraft from two air bases. The state police of three states were alerted and coastal aircraft spotters were notified. It was a big hunt.

Finally, about four a.m., the P.O.D. sheepishly called off the search, saying that a physical check-up had disclosed Dilbert's airplane was on their field, after all.

In blowing off steam about the ruckus this thing had caused, an old pilot-friend of mine ended his letter with. "This whole thing seems to be the work of gremlins."

'Tain't gremlins! Guess I'm just old-fashioned, but I don't believe in "them." All these reports about gremlins botching the works are only the symptoms of a modern aviation disease: gremlinitis.

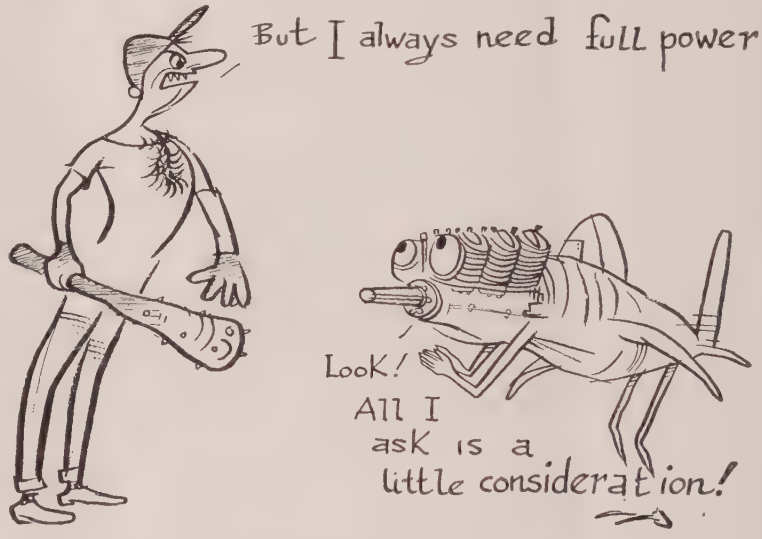
When aviation personnel contract this disease, they begin doping off and doing slipshod work. Then, when something goes wrong, they immediately start yelling, "The gremlins did it!" I'll bet a planter's punch against an ice cream soda (make mine strawberry) that if you backtrack this case carefully, you can put your finger right on the "gremlin" in the woodpile. Someone failed to file or send a report properly, plus maybe the P.O.D. had a lax system of logging flights.

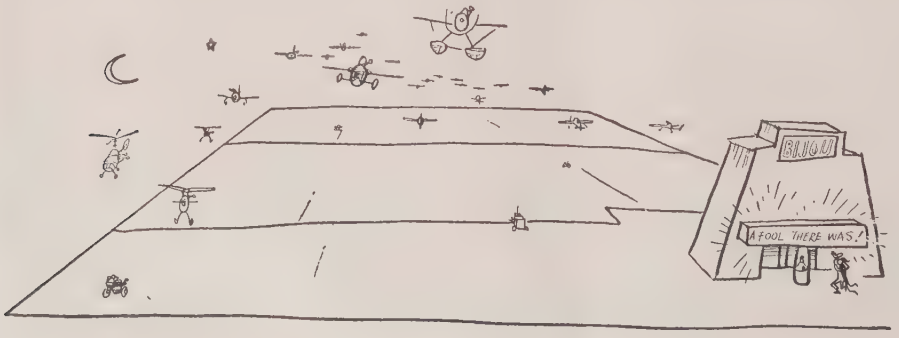
This is a very dangerous disease because it is so contagious. If strong purgatives are not administered in the initial stages, the whole outfit will be infected in a short time. The best prophylaxis against the gremlinitis germ is to wear a bag of asafoetida around your neck, and carry a rabbit's foot or other charm in your pocket; then work like hell to do your job thoroughly and correctly.

Stop Engine Stoppage—Would you like to know how to eliminate most engine failures? It's easy; just treat your engine with respect. Too many pilots know only two throttle positions: closed or wide open.

Modern aviation engines are very dependable. They will take you there and bring you back all day and all night, if you don't abuse them. Continued operation at full power, however, is certain to reduce their durability. Engine bullies who operate this way are practically asking for an engine failure.

If you must use full power to extricate yourself from a tough spot, by all means do so. It may be the lesser of two evils. But don't do it just because you like to go fast. Engine damage is often cumulative; an overheated valve today may let you down tomorrow.





SETH'S SAFETY QUIZ

1. If alternate carb heat is used during take-off, due to icing conditions, how will the take-off run be effected?
2. Should cowl flaps be left open or closed after stopping your engine?
3. Is the minimum altitude for acrobatics over congested areas 3,000, 4,000, or 5,000 feet?

ANSWERS

1. A longer take-off run will be required, because less power will be developed.
2. Open, to prevent heat damage to electrical insulation.
3. Get out of there! Acrobatics over congested areas are forbidden.

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(Continued on page 60)

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(*Continued from page 59*)

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Air Navy...

(*Continued from page 49*)

spotting, for passing the mail, for locating enemy mines, to evacuate wounded, and numerous other tasks required by war.

Even with these accomplishments under its belt, the helicopter hasn't begun to realize its potential capabilities. They're exhausting to fly and their operations have been limited to good weather and daylight. Their range and speed have been limited too, but all of these problems are being overcome by new developments. Many already are being incorporated in the latest types now being delivered to the fleet.

Most helicopter rescue missions are pulled off without mishap and with little or no strain, but in one particular case things didn't go so smoothly.

A *Corsair* pilot had been downed by enemy ground fire. While his squadron mates circled overhead, occasionally spraying the surrounding area with machine-gun fire to keep the Communists away, a helicopter arrived promptly for the rescue. Landing alongside the downed *Corsair*, a 'copter crewman climbed out to pull the wounded pilot from the *Corsair's* cockpit. The 'copter pilot stayed aboard with his engine idling for a quick getaway.

The injured *Corsair* pilot was out cold. No matter how hard he tried, the 'copter crewman just couldn't lift him from the cockpit. So the "windmill" pilot jumped out for an assist. This was a mistake—no sooner had he gotten clear than a gust of wind caught the 'copter's slowly rotating blades and dumped the whole shootin' match into a nearby ditch. The results were disastrous. That left three Americans behind enemy lines with darkness rapidly approaching.

The disturbed *Corsair*-men above immediately radioed for another 'copter, and continued their merry-go-round. Like in the old-time melodramas, helicopter number two arrived in the nick of time and whisked all three out from under the enemy's nose. The helicopter is indeed a versatile bird, and can carry a load as well.

When the Korean venture started, America's Seventh Fleet was already in the Far East guarding Formosa. This fast, mobile force, soon augmented with more power, met the challenge in Korea while maintaining the watch on Formosa. The Fleet has proved itself capable of meeting any situation as it arises. Carriers were on hand when needed, jet operations from flight decks have become routine, new weapons like the helicopter have paid dividends, and lessons have been learned in cold-weather and troop-support operations. But perhaps most important of all, the individual fighting man of our Air Navy has once again shown himself to be made of the same stuff as his fighting forebears.

We pray there will be no more Koreas, in Asia, Europe, or anywhere. But should there be, few military targets of the world are out of reach of modern carrier air might. The Air Navy is ready to meet any threat.

Korea has been the grinding wheel on which Air Navy swords have been sharpened. The swords are sharp.

* * *

The opinions expressed herein are those of the author and not necessarily those of the Navy Department.

New Aid to Navigation Developed

Learmatic Navigator designed to simplify navigation of all planes

by Col. N. F. Silsbee

In his clear and very thoughtful comments on the *Zero Reader,* Wolfgang Langewiesche calls attention to the number of instruments the pilot has to watch, with the eye having to pick up readings on instrument after instrument without ever stopping, plus the additional difficulty that many of the instruments "sense" differently.

It is largely to overcome these difficulties that such composite instruments as Sperry's *Zero Reader* and the more recent Collins Course Indicator-Approach Horizon system were designed. However, these instruments, because of their weight and expense, are only suitable for multi-engine aircraft.

The new *Learmatic Navigator,* on the other hand, is suitable for all types of aircraft, and promises to be a most important addition to the growing list of instruments to enable the pilot to more fully utilize the Common System of All-Weather air navigation, traffic control and landing aids.

It was designed to make navigation simpler and also more accurate by eliminating many of the unnecessary and irksome mental operations which ordinarily are interposed between a navigational problem and its actual solution in flight. It answers the question, "Which way do I turn—right or left?"

The *Learmatic Navigator* combines a magnetic compass, a radio compass pointer, and course selector grid lines—all referenced to a lubber line extending out of a pictorial airplane representing the ship being flown. It presents simultaneously a graphic representation of the magnetic *heading* of your plane, the *course* you want to remember, and the *direction* toward the radio station you have tuned in on your ADF or omni receiver.

This provision of pictorial information requiring no interpretation is one of the *Learmatic's* most valuable features and is right in line with the latest results of psychological studies on pilot reactions, and also with the recommendations of the RTCA SC31 report for the later phases of the Transition Program and for the Ultimate Program.

The *Learmatic Navigator* provides a reference of the ship you are flying in the form of an airplane outlined at the center of the glass with the lubber line extending straight out of its nose, thus furnishing an easy and natural reminder as to the proper direction to turn in order to get on the magnetic or preselected course.

The only thing you have to remember is that you are always steering the little airplane on the glass. You turn in (by turning the actual plane) *towards* the direction on the azimuth (compass) card you want to fly, or *towards* the direction on the grid-pointer lines (selected heading), or *towards* the pointer of the radio compass (or omni) if you want to go to the radio station. It's as simple as that. (See the four elements of the indicator in illustration).

Flight Functions ▶ Here are some of the flight functions which the *Learmatic Navigator* simplifies for the pilot:

(1) For setting up a continuous visual and graphic presentation of the preselected course, and for holding such course in cross-country contact or instrument flight.

(2) For remembering and flying a radio range or localizer course and for the accurate determination of the crab angle necessary to maintain that course, as well as the direction and velocity of the relative wind.

(3) For flying a straight no-drift course towards or away from any radio station, thereby making omniranges (VOR) of all radio stations.

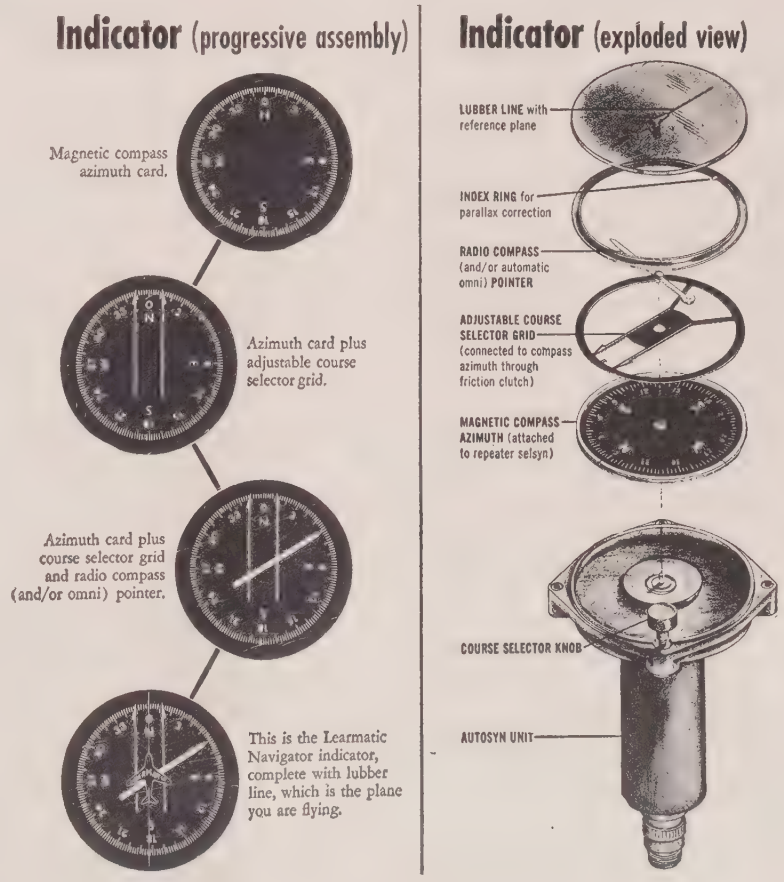
(4) For instrument let-down to any radio range station, or instrument take-off under zero-zero conditions.

(5) For quickly finding the proper runway on any strange airport.

(6) For turning to the correct course

(*Continued on page 62*)

INDICATOR elements are shown in this exploded view of newly announced Learmatic Navigator


Indicator (progressive assembly)
Magnetic compass azimuth card.
Azimuth card plus adjustable course selector grid.
Azimuth card plus course selector grid and radio compass (and/or omni) pointer.
This is the Learmatic Navigator indicator, complete with lubber line, which is the plane you are flying.
Indicator (exploded view)
LUBBER LINE with reference plane
INDEX RING for parallax correction
RADIO COMPASS (and/or automatic omni) POINTER
ADJUSTABLE COURSE SELECTOR GRID (connected to compass azimuth through friction clutch)
MAGNETIC COMPASS AZIMUTH (attached to repeater selsyn)
COURSE SELECTOR KNOB
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DALTON MARK VII COMPUTER: Vector side "mocks-up" track-drift-true heading triangle, allows simple, easily oriented setting-up and solution of all wind problems. Computer side for speed-time-distance, fuel consumption, air speed and altitude corrections, and statute-nautical mile conversions, plus erasable air speed calibration chart and flight log. Only $5.00.

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Lear Develops New Aid to Aircraft Navigation

(Continued from page 61)

immediately after take-off from a strange field.

Learmatic Elements ▶ The elements of the *Learmatic Navigator* indicator are shown in the drawings, with the course selector grid, the radio compass (and/or omnirange) pointer, and the lubber line with reference plane overlaid on the face of the black magnetic compass azimuth card (see also the exploded view for an indication of how the elements work).

The instrument glass forms the panel side of the *Navigator,* and the lubber line provides a constant indication of your plane's direction as read on the compass card and is readily checked against the desired heading as set by the course selector.

What It Does ▶ In flying the four-course L/MF radio range, the *Learmatic* enables you to bracket an A-N beam and hold it. If your selected heading of 270° for example (see Figure A) drifts your ship off course into the "A" signal quadrant, you correct your heading to the left sufficiently to reach and hold the on-course beam signal. As soon as it begins to come through, a quick glance at the *Navigator* tells you the story as to crab angle, drift and relative wind (see Figure B). You can let it stay that way, to illustrate how you are crabbing along, or you can turn the knob of the course selector slightly and adjust the grid to your new heading required to hold the on-course signal (see Figure C).

If you are not flying the range and want to use your radio compass for navigation either to or from a radio station, the *Learmatic Navigator* will enable you to fly a straight-track no-drift ADF course in practically the same way as in bracketing a beam. The same technique allows you to fly an ILS localizer beam.

To make an initial ILS approach,

(Continued on page 64)

LEARMATIC enables pilot to bracket A-N beam and hold it in flying four-course L/MF range

to bracket a beam and hold it...

FIG. A. The pilot of the aircraft at (a) tries to fly the beam by holding a heading of 270° but soon notes that this heading drifts the ship off course into the "A" signal quadrant as shown at (b).

FIGURE A.

FIG. B. The pilot corrects his heading to the left a sufficient amount to reach and hold an on-course signal as shown at (c) One quick glance at the Learmatic Navigator tells him the story of crab angle, drift, and relative wind.

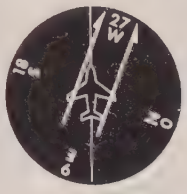

FIGURE B.

FIG. C. The pilot may elect to change his selector grid to the new heading required to hold the on-course signal, in which case the presentation will be as shown in Figure C.

FIGURE C.

Note: *No radio compass indications are shown in these presentations.*

Air Force Work on Omnirange Continues; New Installation Reported

About four years ago the Air Force indicated a requirement for an air transportable (or at least a mobile) version of the CAA's VHF Omnidirectional Radio Range System (VOR). The initial project was designated AN/CRN-22, the C standing for air transportable in a cargo plane, R for radio, N for navigation. This apparently did not prove to be practicable at the time, and development proceeded at USAF's Watson Laboratories, Air Materiel Command, of the AN/FRN-12A, F standing for a fixed installation.

There was a double objective. The first was to develop and place into production the AN/FRN-12A as an Air Force version of CAA's VOR system, with the following improvements and simplified techniques:

(a) Simplify the antenna tuning procedure so that an installation crew with only limited knowledge could install, tune and commission the system.

(b) Cut down station tuning and commissioning time from a matter of months to a matter of days.

(c) Develop a new antenna system which would reduce system error due to vertical polarization effects, heading and attitude effects.

(d) Simplify transmitter tuning and phase stabilize the outputs.

The second and larger objective was to investigate the possibility of single site operation of a combination of VOR, DME, and an X-Band (1000-*mc*) microwave Beacon System.

After development of the protoype model, contracts were given to Lavoie Laboratories for 50 sets of VOR transmitting components; to the Craig Machine, Inc. for shelter, counterpoise and wiring; and to the Federal Telecommunications Laboratory for an entirely new antenna system.

The AN/FRN-12A is built to military standards, and is a rugged, dependable navigation system intended for use anywhere in the world. Depending on terrain, the transmitter has a nominal range of 100 miles, at normal flying altitudes. Two transmitters are supplied for alternate operation. Remote or local telephone dial control is a feature of the equipment. Airport control towers, already badly overcrowded at most fields, need not be further cramped by bulky cabinets, since one small control panel in the tower console, plus a 30 x 23 x 18-inch amplifier-monitor are all that are needed for complete transmitter control. The transmitter may be located up to 30 miles away, and only one telephone pair is required for all control functions, including voice modulation from the tower.

The system as built by Lavoie Laboratories requires only four cabinets at the transmitter location, in addition to the control tower equipment. Thus the volume has been reduced considerably from the original CAA design.

One of the primary points in connection with the project was the development of a new antenna system. After much experimentation and analysis of the problems, Watson Labs and Federal came up with the cage antenna. Briefly, the antenna consists of two cages, one mounted on top of the other.

The lower five-foot section is the active cage. The upper cage is a 12-foot high cylindrical structure having the same diameter as the lower cage. It is added to suppress the unwanted vertically polarized radiation.

Flight tests of the cage antenna were conducted at the Westchester County Airport, New York, but owing to the effects of poor local terrain conditions, it was decided to repeat the tests at a more favorable location, namely Watson Lab's Fort Monmouth, New Jersey site, where some very smooth courses were obtained. As the flight tests proceeded, various lengths of cage extension were used until, in the final test, the cone of silence angle was reduced from 70° to about 10°, and no "push" effects were noticed even with a succession of high angle aircraft banks.

The Air Navigation Development Board expressed interest in the cage antenna and provided funds for a similar test at the CAA Experimental Station, Indianapolis. This was completed with highly satisfactory results, but it was here that it became apparent that the upper cage should be extended to 12 feet for elimination of vertical polarization effects.

New developments and improvements in the Air Force VOR require more precise measurements in flight testing. Much work remains to be accomplished in order to integrate all units into a complete Omnidirectional Radio Range System (VOR) with provisions for Distance Measuring equipment (DME) and for unattended X-Band Beacon (these two in the UHF and SHF band), all three working together at a single site. Some top electronics engineers and operations experts are a bit skeptical as to the ultimate practicability of this ambitious project, but the Air Force engineers of the Rome Air Development Center are confident that they will ultimately lick the problem.

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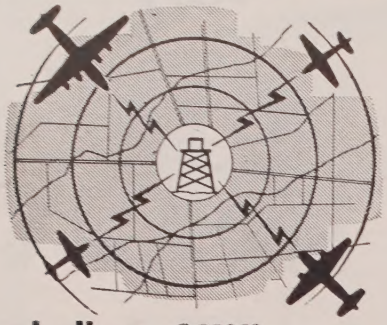

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Lear Develops New Aid to Aircraft Navigation

(Continued from page 62)

you simply follow the pattern for the particular airport as shown on your instrument flight chart, and use the outer marker (with non-directional radio beacon) for your orientation. Your course selector is set to the magnetic bearing from the outer marker to the ILS runway, and as you follow the prescribed pattern the lubber line (which is *your plane*), the course selector and radio compass pointer will provide you at each moment with a graphic picture of your relationship to the outer marker and your required heading for the landing. When you have made your final turn, all three will be pointing directly ahead.

I think a lot of pilots are going to be intrigued by the simplicity and the versatility of this newest aid to aircraft navigation.

CAA Big Buyer in Electrical Supply Field

The Civil Aeronautics Administration is a substantial purchaser of equipment in the electrical and electronic fields, a survey of 1951 purchases reveals. Contracts for the year total about $15,000,000, of which some $5,600,000 went to major manufacturers and $9,400,000 to small business firms.

CAA construction and maintenance of the Federal Airways is an important part of the defense effort, and contractors are accorded priorities in materials.

PILOT who is not flying the range but wants to use his radio compass for navigation either to or from a radio station can fly a straight-track no-drift ADF course with the Lear Navigator in practically the same way as in bracketing a beam. The same technique permits a pilot to fly an ILS localizer beam. In reading diagram *(below)* begin at bottom of page

to fly a straight-track, no-drift ADF course...

(Note: Figures corresponding to this text start at the bottom of the page and proceed upwards.)

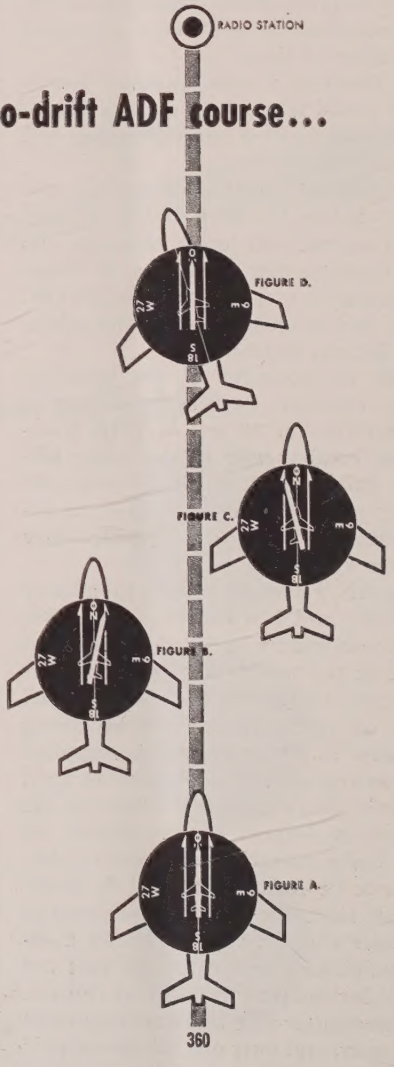

FIG. A. The station is on a bearing of 360° from the aircraft. The aircraft is on track and on heading.

FIG. B. The Learmatic Navigator shows that the aircraft has drifted off 10° to the left of the track.

FIG. C. This is what the presentation would be after flying the same amount of time if the wind were from the *left* and of the same velocity.

FIG. D. The aircraft is now back on the desired track and holding to it. Note the required crab angle of 10° left indicated by the Learmatic Navigator in order to hold the radio compass indicator needle parallel to the course selector grid.

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